Exhibit A
(previously filed as Dkt. 660-1)

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
Alexandria Division

United States of America, *et al.*,

Plaintiffs,

v.

Google LLC,

Defendant.

Case No. 1:23-cv-00108-LMB-JFA

Hon. Leonie H. M. Brinkema

EXPERT REPORT OF ROBIN S. LEE, PHD

December 22, 2023

I. Introduction

I.A. Qualifications

(1) I am an economist, specializing in the field of industrial organization. Industrial organization studies the structure and functioning of markets, and competition among firms. I received my undergraduate and graduate degrees from Harvard University, receiving my AB in Economics in 2003, my AM in Economics in 2005, and my PhD in Business Economics in 2008.

(2) I am a Professor of Economics in the Department of Economics at Harvard University and regularly teach courses in industrial organization to graduate and undergraduate students. Previously, I have served on the faculty at New York University's Stern School of Business where I taught MBA students. I have published thirteen articles in peer-reviewed journals, including the *American Economic Review, Econometrica,* and the *Journal of Political Economy.* My published work has examined issues related to competition in a variety of industries characterized by network effects. I have also coauthored a chapter covering empirical analysis of contracting in vertical markets that appeared in the most recent volume of the Handbook of Industrial Organization (Elsevier, 2021). I have served as a Co-Editor of the *American Economic Journal: Microeconomics* and as an Associate Editor of the *International Journal of Industrial Organization*, both of which are leading journals in the field of industrial organization.

(3) In my academic positions at New York University and Harvard University, I have supervised the thesis research and served on the dissertation committees of 25 economics PhD candidates. I have received several awards of recognition for my academic work, including the Econometric Society's Frisch Medal (an award presented biennially for the best applied paper published in *Econometrica*), the American Antitrust Institute's award for Best Antitrust Article on Mergers, and the Association of Competition Economics' Best Paper Prize.

(4) I have served as an economic expert on several antitrust matters in the past.

(5) My curriculum vitae is Appendix A to this report. It contains additional information about my professional experience, including my publications and prior testifying experience.

I.B. Scope of charge

(6) I have been retained by the United States Department of Justice on behalf of Plaintiffs in this case. Plaintiffs allege that the Defendant, Google, "has used anticompetitive, exclusionary, and unlawful

an ad tech product as it handles more transactions. Scale benefits can be reinforcing and lead to durable advantages over rivals over time.

(23) Next, having provided that background, I evaluate in **Section IV** the relevant antitrust markets alleged by the Plaintiffs. Defining relevant markets involves identifying a set of products over which a hypothetical monopolist could possess and profitably exercise significant market power. Market definition is a useful tool for analyzing monopolization claims, as it assists with the assessment of market power and helps focus attention on areas where potential competitive effects from the conduct at issue are most likely to occur.

(24) In this Section, I explain why *publisher ad servers*, *ad exchanges*, and *advertiser ad networks* for open-web display advertising are relevant product markets, where:

- *Publisher ad servers* are software products used by open-web publishers to manage and sell display ad “inventory” (i.e., website ad space), both through transactions that are directly negotiated with advertisers in advance, and through “indirect” transactions that are sold in “real-time” whenever a user visits a website and new display ad impressions become available for sale;
- *Ad exchanges* are software products that run real-time auctions for publishers’ display ad inventory among advertisers; and
- *Advertiser ad networks* are software products that advertisers use to purchase display ad inventory from publishers.

(25) Figure 1, based on a June 2020 Google presentation, provides a simplified depiction of various ad tech products and the transactions that they facilitate. Publishers (i.e., sellers) are on the left-hand side, advertisers (i.e., buyers) are on the right-hand side, and ad tech products are in the middle. The diagram shows different sets of ad tech products, including those belonging to the relevant product markets: publisher ad servers, ad exchanges, and advertiser ad networks. The diagram also depicts Google’s ad tech products.

II. Industry background

(47) In this section, I provide an overview of the role that advertising technology ("ad tech") products play in facilitating transactions for digital display advertising ("display advertising"). This discussion provides background for my analysis in this report.

- In Section II.A, I describe display advertising, how it compares to other forms of digital advertising, and different types of display advertising transactions.
- In Sections II.B and II.C, I discuss ad tech products that facilitate the sale of display advertising in more detail, and describe Google's products in this industry.
- In Section II.D, I describe how ad tech products typically charge fees to customers.
- In Section II.E, I describe how the sale of display advertising has evolved over time.

II.A. Digital display advertising

(48) Digital advertising, also referred to as online advertising, is the single largest type of advertising media by revenue both globally and in the United States.[7] Figure 3 below shows revenues for different advertising media in the United States in 2021. Spending on digital advertising has exhibited steady growth over the past decade. Figure 4 below shows trends in US and worldwide digital advertising spending from between 2011 and 2022.[8]

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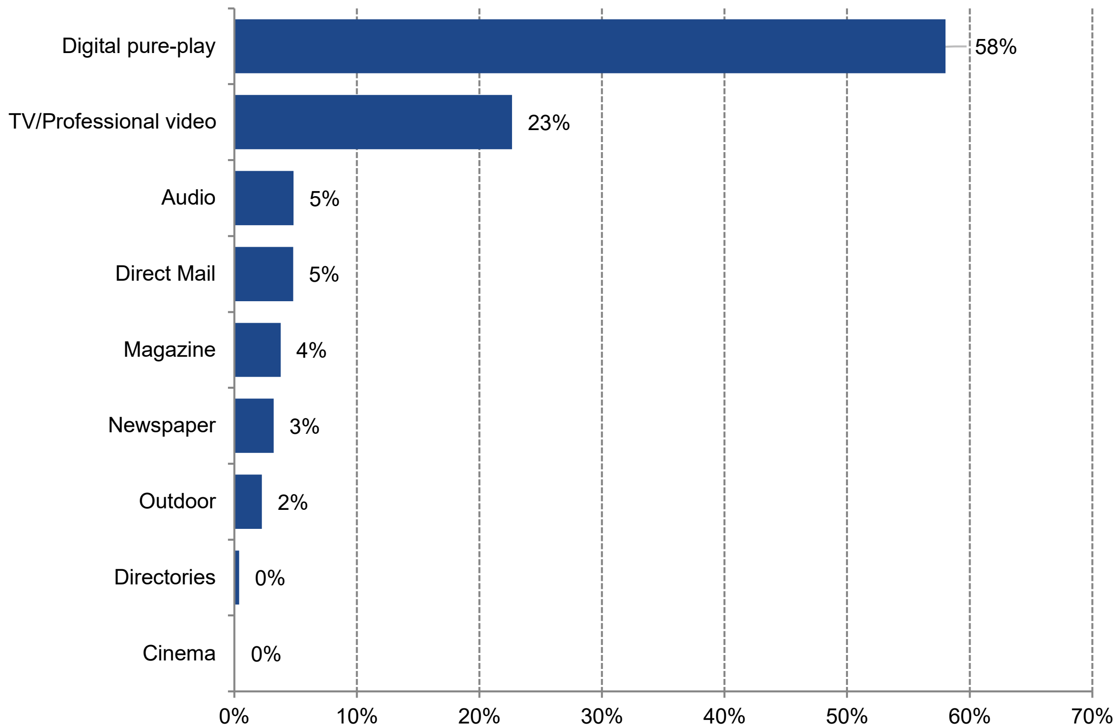
7 According to data from eMarketer, a market research company, in the United States, digital advertising generated $221 billion in revenue in 2021 accounting for approximately 70% of all advertising revenue; globally, digital advertising generated $506 billion in revenue, representing 63% of all advertising revenue in 2021. Worldwide digital ad spending data (eMarketer) at tab "Total, Digital, and Mobile," rows 73, 86, 283, 296 (n.d.).

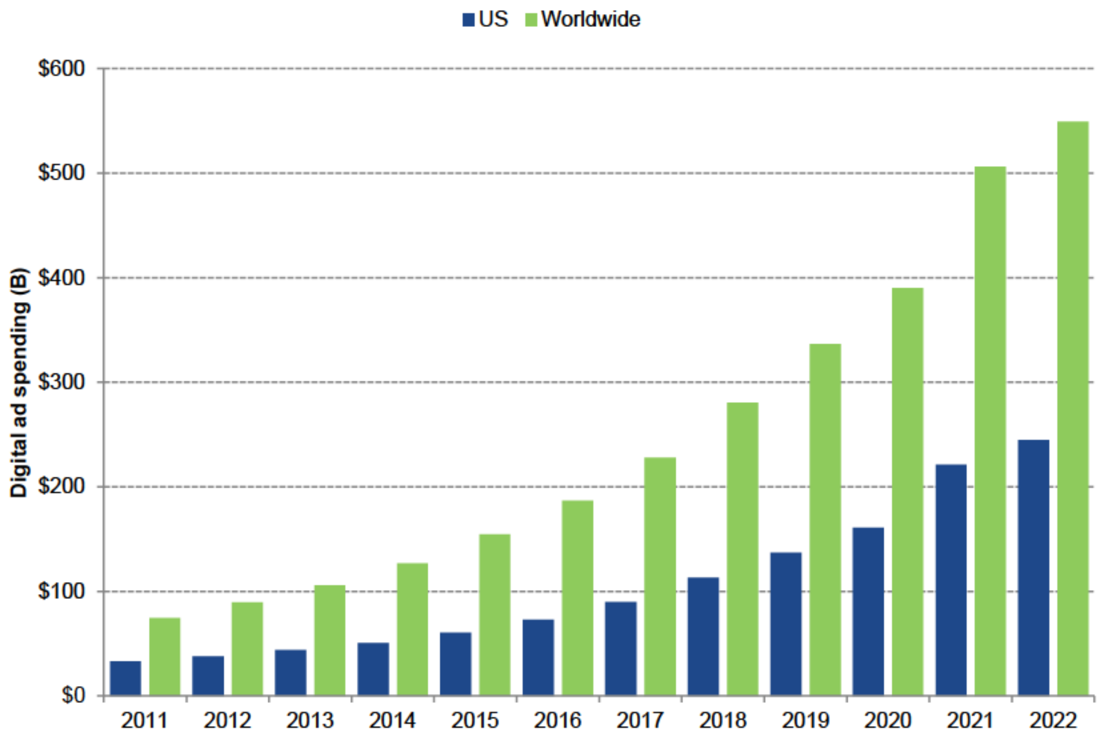
8 Within digital advertising, spending on display advertising has also exhibited growth during this period. *See* Figure 78 in Appendix C.

Figure 3. Revenue share by type of advertising media in the United States (2021)



Source: GroupM, "This Year Next Year: 2022 Mid-Year Advertising Forecast", GroupM, June 2022, 40, https://d2ksis2z2ke2jq.cloudfront.net/uploads/2022/06/GroupM_TYNY_June2022.pdf. Digital "pure-play" refers to advertising on digital/online-only venues. Television/Professional Video includes standard and "connected" TV, which refers premium television content streaming from apps on a smart TV or an internet-connected ("over-the-top") device. *See* The Trade Desk, "Connected TV," The Trade Desk, accessed December 15, 2023, https://www.thetradedesk.com/us/our-platform/dsp-demand-side-platform/connected-tv.

Figure 4. US and worldwide digital advertising spend trends (2011–2022)[9]



Source: Worldwide digital ad spending data (eMarketer) at tab "Total, Digital, and Mobile," rows 73, 86 (2022)
Notes: Includes advertising that appears on desktop and laptop computers as well as mobile phones, tablets, and other internet-connected devices. Source: Worldwide digital ad spending data (eMarketer) at tab "Total, Digital, and Mobile," rows 73, 86 (2022).
Notes: According to eMarketer, a market research company, digital ad spending includes advertising that appears on desktop and laptop computers as well as mobile phones, tablets, and other internet-connected devices; and includes banner ads and other (static display ads such as Facebook's News Feed Ads and Twitter's Promoted Tweets), classified ads, email (embedded ads only), mobile messaging (SMS, MMS, and P2P messaging), rich media (including in-stream and outstream video ads), search ads (including contextual text links, paid inclusion, paid listings, and SEO), sponsorships, lead generation (referrals).

(49) Industry participants often divide digital advertising into different segments, including display, search, instream video, and native (as well as other smaller categories). I briefly describe these segments below:

1. **Display**: Digital display advertising refers to image or text-based advertisements (ads) that internet users see online.[10] Display ads include "banner ads," which the IAB, an online-

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[9] Trends reflect actual values through 2022. Letter from D. Pearl to M. Freeman (09/08/2023).

[10] *See*, e.g., IAB, "Internet Advertising Revenue Report: Full-year 2022 results," https://www.iab.com/wp-content/uploads/2023/04/IAB_PwC_Internet_Advertising_Revenue_Report_2022.pdf. Display ads may include static images as well as "rich media," which can include video components. Google, "What is rich media?" Studio Help, accessed December 14, 2023, https://support.google.com/richmedia/answer/2417545?hl=en (Google defines rich media as "a digital advertising term for an ad that includes advanced features like video, audio, or other elements that encourage viewers to interact and engage with the content").). Videos that are contained as part of display ads (e.g., a video that is part of a banner ad at the top of a website) are referred to as "outstream" or "in-display" video

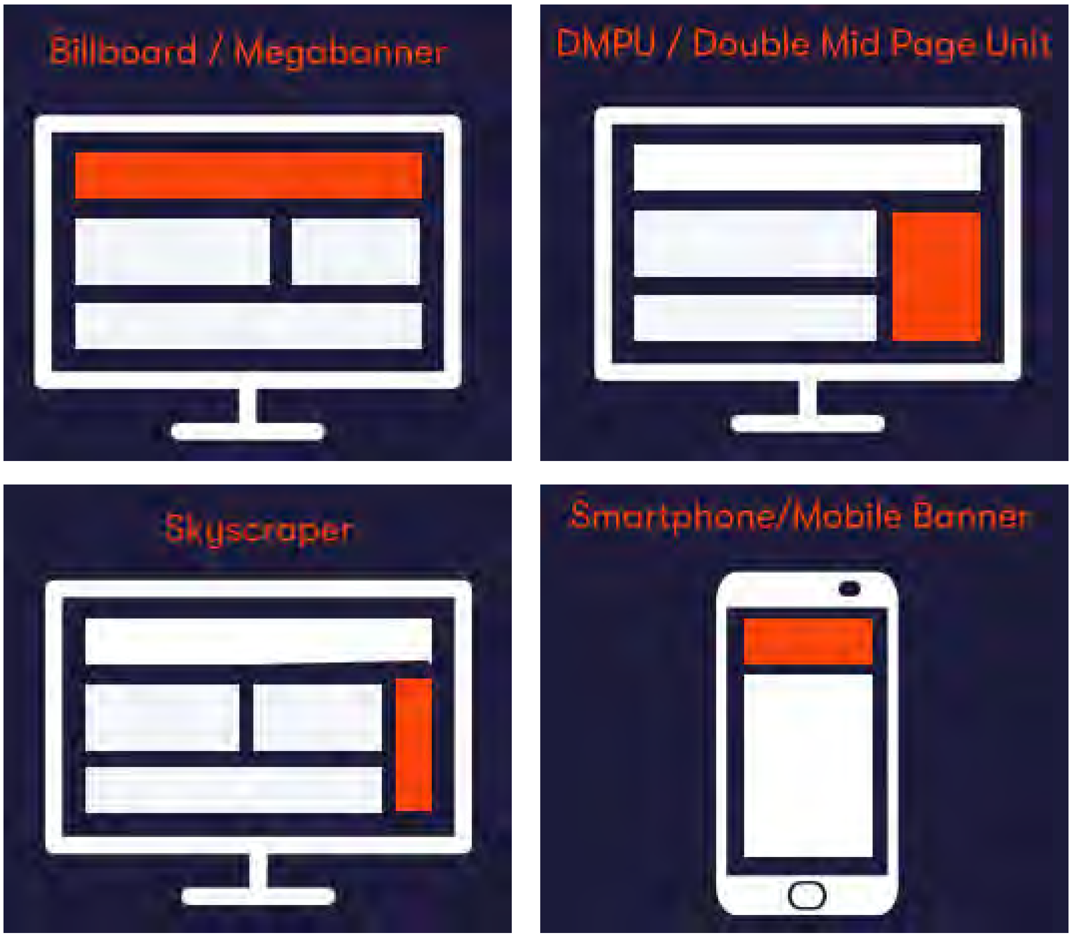
advertising trade organization, calls "one of the most dominant forms of advertising on the internet."[11] Display ads may include items such as text, images, video, audio, and often come in a set of predetermined formats and sizes.[12] Figure 5 below shows examples of common placements of display ads on websites and Figure 6 shows an example of how display ads may appear for a user when visiting two different websites.

advertisements. Video ads may also be shown in video players included on websites. These are referred to as "instream video" ads and may play before, during, or after dedicated video content. *See* Section II.A and Section IV for further discussion.

[11] IAB, "Internet Advertising Revenue Report: Full-year 2022 results," IAB, April 2023, p. 22 https://www.iab.com/wp-content/uploads/2023/04/IAB_PwC_Internet_Advertising_Revenue_Report_2022.pdf.

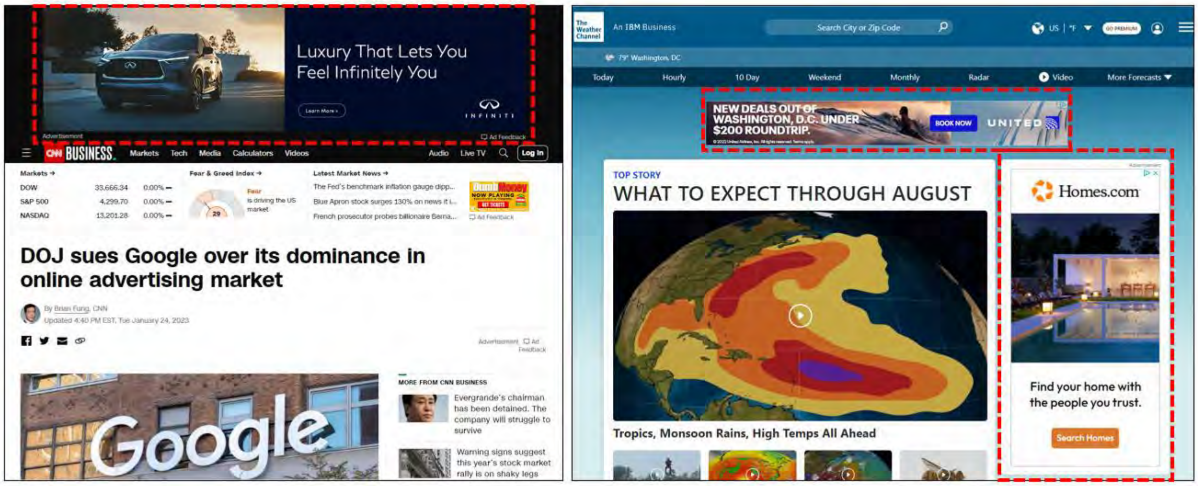
[12] IAB UK, "Jargon Buster," IAB UK, https://www.iabuk.com/jargon-buster?letter=33&title=&page=1. IAB UK, "Introduction to digital display advertising for media owners", IAB UK, last modified (06/June 2021), https://www.iabuk.com/sites/default/files/public_files/Introduction-to-digital-display-advertising-for-media-owners_0.pdf.

Figure 5. Examples of common display ad locations as specified by the Internet Advertising Bureau (IAB)



Source: IAB UK, "Introduction to digital display advertising for media owners", IAB UK, last modified (06/2021) https://www.iabuk.com/sites/default/files/public_files/Introduction-to-digital-display-advertising-for-media-owners_0.pdf.

Figure 6. Examples of display ads shown on websites



Source: CNN, captured September 29, 2023, www.cnn.com. The Weather Channel, captured July 31, 2023, www.weather.com.
Notes: Red dashed lines highlight display ads.

2. **Search**: Search ads are ads shown alongside search results from a search engine and are often linked to a certain search word or phrase. Advertisers generally bid on search advertising slots that are relevant to certain keywords[13] and pay for these advertisements on a cost-per-click ("CPC") basis.[14] These paid listings may appear as "sponsored" links at the top or side of search results.[15] Figure 7 below shows an example of how paid listings may appear alongside standard search results.

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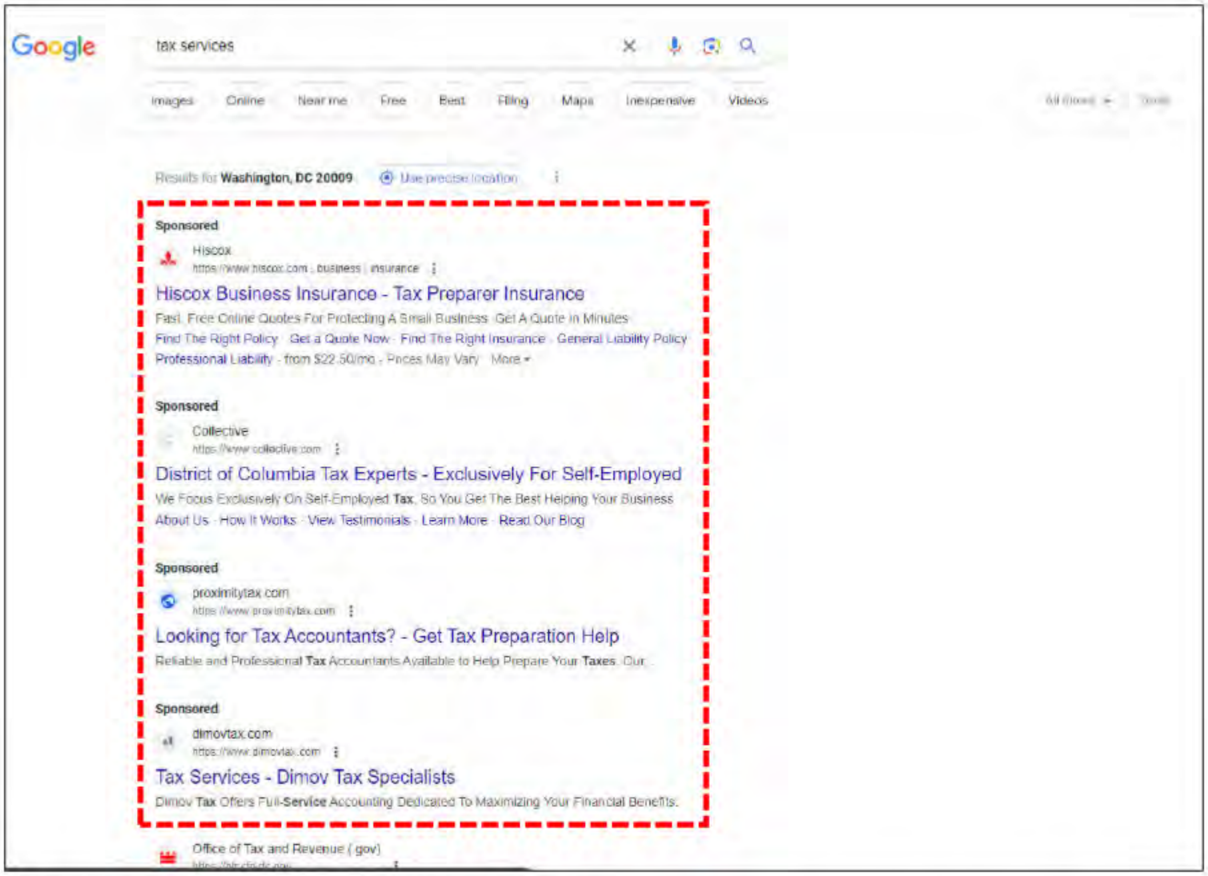
[13] Google, "The ad auction," Google Ads Help, accessed December 15, 2023, https://support.google.com/google-ads/answer/1704431.

[14] Google, "Actual cost-per-click (CPC): Definition," Google Ads Help, accessed December 15, 2023, https://support.google.com/google-ads/answer/6297?sjid=15864561118467767985-NA ("Your actual cost-per-click (actual CPC) is the final amount you're charged for a click.").

[15] IAB, "Internet Advertising Revenue Report: Full-year 2022 results," IAB, April 2023, https://www.iab.com/wp-content/uploads/2023/04/IAB_PwC_Internet_Advertising_Revenue_Report_2022.pdf, at 23. Google also distinguishes between search ads, display content, in-stream video content, and in-app ads. *See*, e.g., GOOG-DOJ-AT-02199478, at -485 (06/2019).

Figure 7. Examples of search ads



Source: Google, captured on August 30, 2023, www.google.com.
Note: Red dashed lines highlight search ads. Ads shown on the Google Search result page are identified with a "Sponsored" label at the top of the ad.

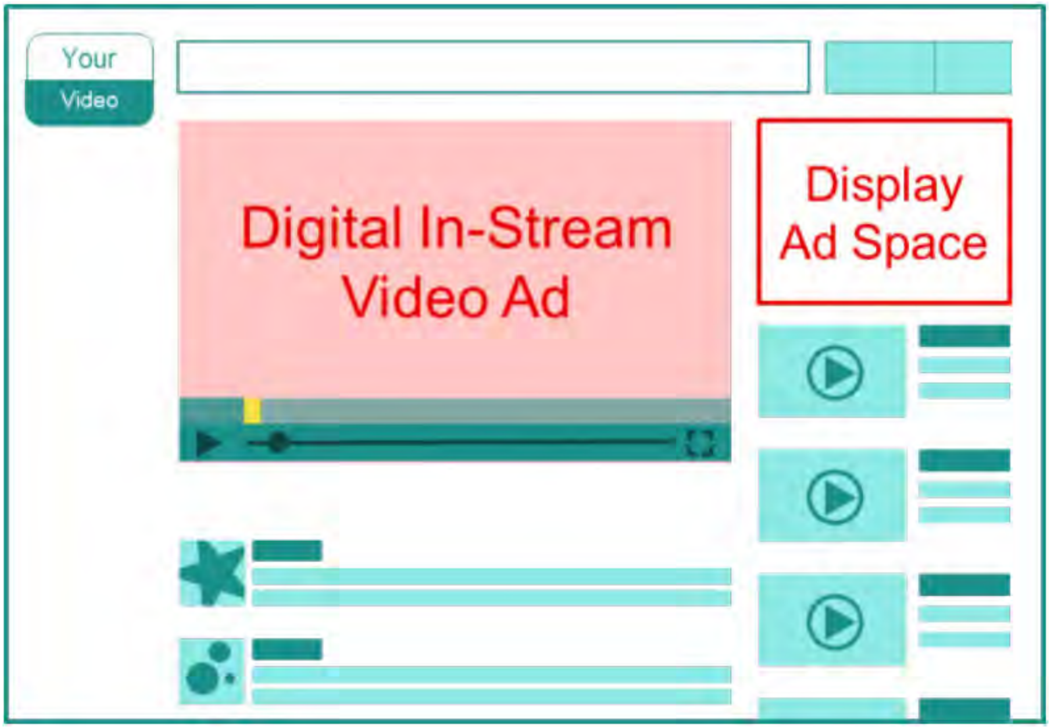
3. **Instream video**: Instream video ads are shown within a video player on a website, or in applications on mobile devices or connected TVs.[16] Instream video ads are viewed in a video player before, during, or after the original site's video content.[17] Instream video ads are distinct from "outstream" or "in-display" video ads, which are videos played in standard display ad

[16] IAB, "Definitions and Terminology," IAB, https://www.iabuk.com/ctv/glossary (defines connected TV as "[v]ideo content consumed on a TV screen, delivered via an internet connection. This includes TVs directly connected to the internet (Smart TV), as well as hardware that enables a TV to become connected, e.g. TV sticks, games consoles and set-top boxes that are connected to the internet.").

[17] IAB, "Digital Video In-Stream Ad Format Guidelines," Interactive Advertising Bureau (IAB), January 8, 2016, https://www.iab.com/wp-content/uploads/2016/01/DVAFG_2015-01-08.pdf, at 7 (defining digital video in-stream ads as "ad formats served into a video player: 'before, during, and after a variety of content including, but not limited to, streaming video, animation, gaming, and music video content in a player environment.'"); IAB UK, "A Guide to the Connected TV Supply Chain," IAB UK, March 2, 2021, https://www.iabuk.com/standard-content/guide-connected-tv-supply-chain ("The most prevalent format [of advertising on Connected TV] is instream video (pre-roll, mid-roll and post-roll)").

spaces and can be substituted in those spaces for "static" images.[18] Figure 8 below shows how instream video ad slots differ from display ad slots. In this report, I follow industry convention and distinguish between instream and outstream video ads, and use *display ads* to include outstream video but not instream video ads.

Figure 8. Example of digital instream video ad formats as specified by the Internet Advertising Bureau



Source: IAB, "Digital Video In-Stream Ad Format Guidelines,",IAB, January 2016, p. 7, https://www.iab.com/wp-content/uploads/2016/01/DVAFG_2015-01-08.pdf.

4. **Native**: Native ads are designed to blend in with the environment in which they are placed. While there are different types of native advertisements, the distinguishing feature of these ads is that

[18] The IAB defines the "Display (Banner / Rich Media)" advertising format as "a form of display advertising that can range from a static graphic to full motion video," and notes that "Video commercials that appear in video players are considered Digital Video Ads, not Rich Media." *See* Internet Advertising Bureau, "Internet Advertising Revenue Report: Full-year 2022 results," PwC & IAB Interactive Advertising Revenue Report, April 2023, https://www.iab.com/wp-content/uploads/2023/04/IAB_PwC_Internet_Advertising_Revenue_Report_2022.pdf. In Sections II and IV, I discuss differences between instream and outstream video ads further. *See also* IAB, "Digital Video In-Stream Ad Format Guidelines," IAB, January 8, 2016, https://www.iab.com/wp-content/uploads/2016/01/DVAFG_2015-01-08.pdf ("[A]ds in video format served to placements designated for display advertising are often confused with in-stream ads. Because video in-stream ads and in-display video are two ad forms that require different resources and technology, distinguishing the two are important to establishing digital video in-stream ad formats.").

they often mimic the style and structure of the surrounding content.[19] The following are prominent forms of native ads:

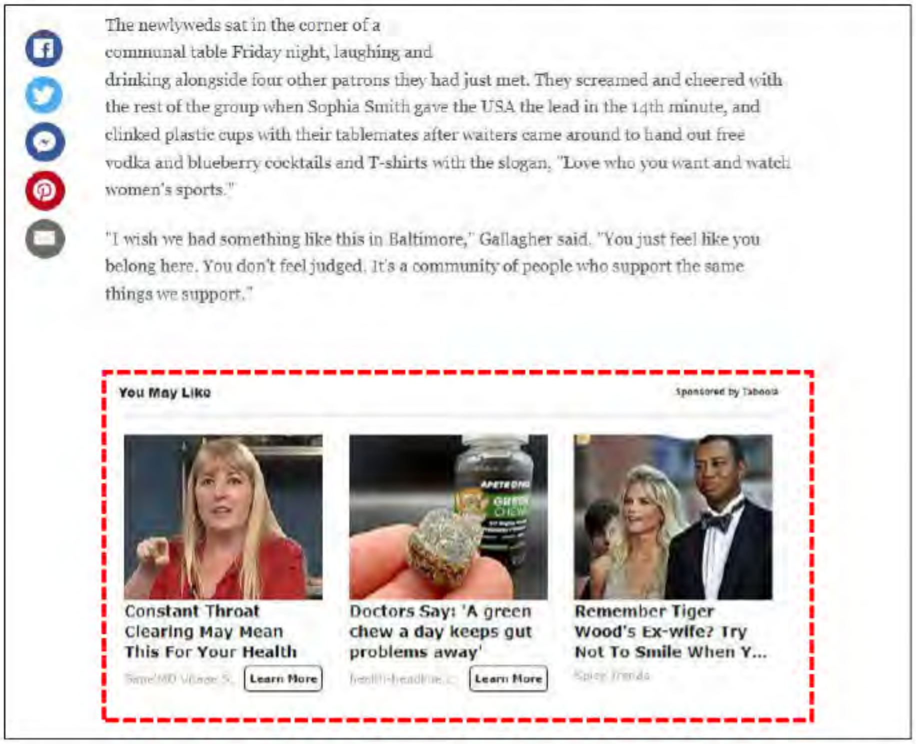
A. *Content recommendation* ads are collections of links that suggest additional external content for users. Advertisers may purchase these ad slots with the intention of driving traffic to the posted content.[20] Content recommendation ads are considered by many industry participants to contain lower quality content than display ads, with a significant amount of spend coming from "clickbait" ads; as a result, website operators tend to place these ad units at the bottom of their pages or prefer to not use them at all.[21] Figure 9 below shows an example of a content recommendation widget displayed on a webpage—in this case below a news article. Figure 10 shows how Google's Multiplex content recommendation product appears on a desktop computer.

[19] Although some sources may consider part of native advertising to be a part of display advertising, to be precise in my discission, I do not use the term "display advertising" in this report to include native advertising unless explicitly stated otherwise. I discuss differences between display ads and native ads further in Section IV.B.1.a.ii.

[20] MMA Mobile Native Advertising Committee, "The Mobile Native Ad Formats," *Mobile Marketing Association*, accessed December 18, 2023, https://www.mmaglobal.com/files/documents/the_mobile_native_formats_final.pdf.

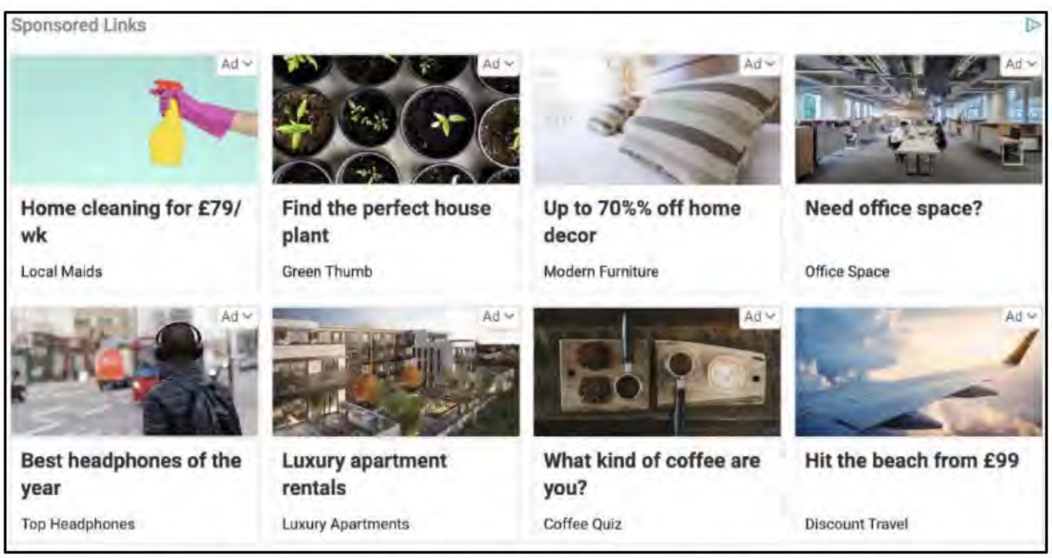
[21] GOOG-AT-MDL-003644990, at -995 (05/23/2017) ("Over the past several years the web has seen a proliferation of content recommendation ad units from three main companies: Taboola, Outbrain, and RevContent (TBOBRC)… These companies have grown enormously by peddling clickbait ads (sometimes scams and often NSFW) that generate high CTRs and CPMs for publishers… Because the minimum quality bar is set somewhere around "it makes me sick to my stomach" (real publisher quote), publishers typically relegate [content recommendation] ad units to the bottoms of articles. However the same publishers describe the revenue (often in the form of a guaranteed CPM) as 'like crack' which is why so few have chosen to abandon these ad units."); GOOG-DOJ-AT-00344037, at -068 (05/2017) (in reviewing the importance of content recommendation advertisements to publishers, Google noted testimony from a publisher who said "we were working with Taboola, but we ended our contract, because we were not pleased with the format and performance as far as to justify having additional ad code to slow things down".) *See also* Section IV.B.1.a.ii.

Figure 9. Example of content recommendation displayed below site content



Source: Jamie Goldberg, "First US all-women's-sports bar embraces the Women's World Cup", ESPN, captured on August 30, 2023, https://www.espn.com/soccer/story/_/id/38049431/uswnt-world-cup-game-sports-bra-portland-oregon.
Note: Red dashed lines highlight native ads shown through content recommendation.

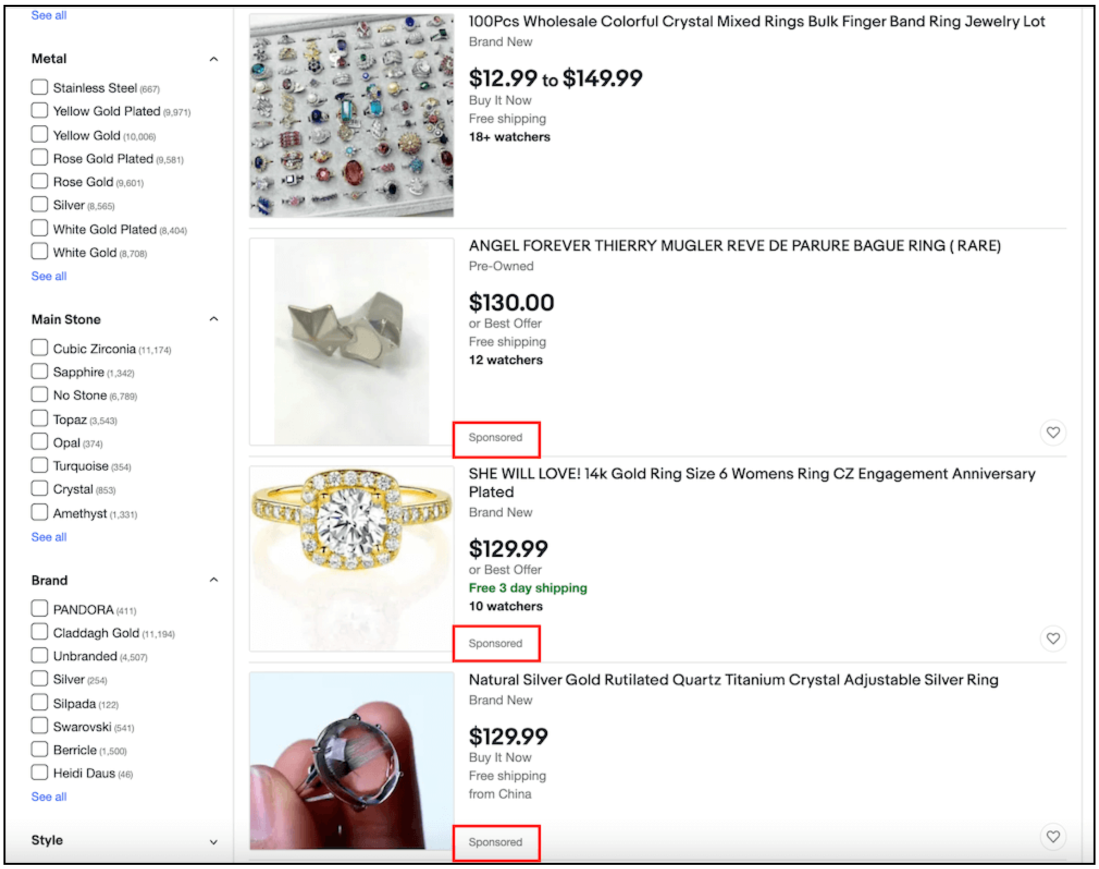
Figure 10. Example of Google's Multiplex content recommendation advertising on desktop



Source: Google,"About Multiplex ads," Google AdSense Help, accessed December 18, 2023, https://support.google.com/adsense/answer/9189566?hl=en.

B. *Sponsored Product* or *Sponsored Listing* ads promote specific products alongside "organic" product listings on e-commerce sites within search results or in suggested product pages.[22] These may appear similar to organic product listings with prices, reviews, and product details appearing in paid ad slots.[23]

Figure 11. Example of sponsored listing ads alongside organic listings on Ebay



Source: Kevel, "Sponsored Listings: The Definitive Guide for 2023," Kevel, last modified March 2, 2019, https://www.kevel.com/blog/sponsored-listings.

C. Social media (or "in-feed social") ads appear in social media feeds and closely resemble organic posts on those sites.[24] Users of the social media site can often engage with (e.g.,

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[22] GOOG-AT-MDL-000001750, at -750 (06/10/2021) ("Sponsored Product Ads (SPAs) are natively rendered, click on site ads on e-commerce publishers' sites/apps. These ads can appear in search results…, category browsing, or on product detail pages (e.g. 'you may also like..')").

[23] MMA Mobile Native Advertising Committee, "The Mobile Native Ad Formats," *Mobile Marketing Association*, accessed December 18, 2023, https://www.mmaglobal.com/files/documents/the_mobile_native_formats_final.pdf

[24] Some in-feed ads can also be shown on non-social media sites. These ads are distinct from display ads because the ad slot blends in with the publisher's content (as opposed to occupying space on top of or around it) and the ad creative matches the aesthetic of the publisher's content. *See* Interactive Advertising Bureau, Interactive Advertising Bureau, "Native Advertising Playbook 2.0" Internet Advertising Bureau*,* May 2019, https://www.iab.com/wp-content/uploads/2019/05/IAB-Native-Advertising-Playbook-2_0_Final.pdf; MMA Mobile Native Advertising

by reacting or commenting) the post. Advertisers may purchase these ad slots with the intention of building brand awareness, creating intent, or finding new customers.[25] While these ads are most often shown on the sites of social media pages such as Facebook, Instagram, or Twitter, Google has a similar in-feed ad product, known as "Discovery ads" that are shown on YouTube, Gmail, and on Google's Discover search feed.[26] Figure 12 below shows how an in-feed social media advertisement may appear on a social media site.

Committee, "The Mobile Native Ad Formats," MMA Mobile Native Advertising Committee, *Mobile Marketing Association*, accessed December 18, 2023, https://www.mmaglobal.com/files/documents/the_mobile_native_formats_final.pdf. In-feed ads can require substantial technical capability and be limited to more sophisticated publishers. *See* GOOG-AT-MDL-000994606, at -669 (07/19/2019) ("Creating a good looking, high performing native ad requires effort and skill. We strongly encourage publishers to use our templates as a starting point and to involve their design and engineering teams in the process… When a native ad is in a feed it should very closely match your site/apps layout. Plan on starting with a pre-made template but making significant edits to the CSS for layout, font, and styling.").

25 MMA Mobile Native Advertising Committee, "The Mobile Native Ad Formats," Mobile Marketing Association, accessed December 18, 2023, https://www.mmaglobal.com/files/documents/the_mobile_native_formats_final.pdf, at 7–8. *See also* GOOG-AT-MDL-009638243, at -275 (06/05/202).

26 GOOG-AT-MDL-009638243, at -246 (06/05/2020). As I explain further in Section IV, both Google and industry participants recognize social media advertising as distinct from display advertising.

Figure 12. Example of in-feed social native ads shown on Facebook

Source: Facebook, captured November 9, 2023,www.facebook.com.
Note: Red dashed lines highlight in-feed social ads (known as "Facebook Feed"). *See* Meta, "About Meda ads placements", Meta Business Help Center, accessed December 18, 2023, https://www.facebook.com/business/help/407108559393196?id=369787570424415.

(50) Ad types can also be distinguished based on where digital advertising is shown. Web advertising refers to digital ads shown on websites, viewed on both desktop and mobile devices. In-app advertising refers to digital ads delivered within mobile applications, including those that are accessible on smartphones, tablets, or wearable devices.[27]

[27] *See* Interactive Advertising Bureau Europe, "IAB Europe's Guide to In-App Advertising," February 2022, https://iabeurope.eu/wp-content/uploads/2022/02/IAB-Europe-Guide-to-In-app-advertising.pptx.pdf, 6 ("In-App advertising refers to ads and ad campaigns that are delivered within mobile applications, including smartphones, tablets, or wearable devices").

II.A.1. Ad tech products for display advertising and their customers

(51) "Ad tech," short for advertising technology, refers to software and other tools used to purchase, sell, and manage digital display advertising. I refer to companies offering ad tech products as ad tech intermediaries.

(52) Customers of ad tech products are advertisers and publishers of online content. Advertisers attempt to cost-effectively target their display ad campaigns at what they perceive to be high-value audiences, while publishers often seek to monetize their digital assets by selling online ad space on their websites, also referred to as their display ad "inventory."[28] Because advertisers are buyers and publishers are sellers of display ad inventory, advertisers are said to be on the "demand-side" (or "buy-side") while publishers are on the "supply-side" (or "sell-side").

(53) A variety of ad tech products work in conjunction with one another to facilitate display advertising transactions between publishers and advertisers. These products form what is known as the "ad tech stack." At a high level, the ad tech stack can be described as comprising three "layers" consisting of ad tech products that each serve different functions:

- publisher ad servers;
- ad exchanges; and
- advertiser bidding tools, comprising both demand-side platforms ("DSPs") and advertiser ad networks.[29]

(54) The purchase of a single online display ad "impression" (i.e., a single display ad shown to a single web visitor) by an advertiser from a publisher often involves participation by products in each of these layers. I describe these ad tech products in more detail in Section II.B.

(55) The focus of this report is ad tech products for display ads that are shown on websites, so unless otherwise specified, I will use the term *publishers* to refer to entities that operate online web pages and display content to web visitors. These publishers often monetize their web traffic by devoting some of the space on their web pages to display advertising. I will use the term *open-web publishers* to refer to those publishers that rely on third-party ad tech products (i.e., products that these publishers do not themselves own) to sell their display ad inventory.[30] Examples of large open-web publishers are USA Today, Weather.com, and Vox. In contrast, there are other publishers, including

[28] There are some forms of display ads that do not appear on websites, a notable example being in-app display ads. As I explain in Section IV, in-app ads are a distinct form of advertising from open-web display ads. Google also distinguishes between display, video, and in-app inventory. *See* GOOG-DOJ-AT-02199478, at -485 (06/2019).

[29] Certain ad networks can also be used to connect advertisers and publishers without relying on exchanges or publisher ad servers. *See* Section II.B.2.b.

[30] Unless otherwise specified, I use "publishers" in this report to mean "open-web publishers," as these are the publisher customers of the ad tech products that are the focus of this report.

Amazon and large social media publishers such as Facebook, that sell their owned and operated (O&O) display ad inventory to advertisers through their own integrated, internally supplied ad tech tools ("integrated advertising tools").[31]

(56) In my report, I use "open-web display advertising" to refer to display ads shown on the websites (which can be viewed on desktop or mobile devices) of open-web publishers. This excludes other forms of digital advertising (including search and instream video), and display ads that are shown in applications used on mobile devices or on TV media players.[32] Similarly, unless otherwise specified, I use the term *advertisers* in this report to refer to entities that purchase display advertising inventory.

(57) Even though website visitors and hence viewers of display ads ("users" or "consumers") are not direct customers of ad tech products, they too can be affected by changes in the quality or cost of display advertising. For example, users may benefit if display ads become more "relevant," which can mean that ads more frequently contain valuable information for consumers. They may also benefit if increased monetization from display advertising allows publishers to fund the creation of new content. On the other hand, users can be made worse off if display advertisements become less relevant, rely on more personal data, become more expensive and lead to higher final prices of goods or services, or if publishers earn less from the sale of online display inventory and therefore are less able to produce valuable content.

II.A.2. Uses of different forms of digital advertising

(58) Companies use advertising to achieve a variety of goals. Potential goals include building awareness for a company's products or brand, communicating a product's attractiveness compared to alternatives ("consideration"), or acquiring a new customer and inducing them to make a purchase ("conversion").[33] These and other roles played by advertising are often described by marketers as corresponding to different stages of a consumer's "journey" toward making a purchase. Marketing

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[31] In a strategy document, Google described Facebook and Amazon as "typically requiring purchase through their buying door" in order to secure advertising inventory on their pages and referred to them as "[e]stablished walled gardens." *See* GOOG-AT-MDL-001970341, at -348 (08/2021). *See also* GOOG-TEX-00151409, at -409 (08/18/2017) (describing Amazon and Facebook's "walled garden inventory" and access to "open ecosystem inventory"); GOOG-DOJ-04442323, at -350 (2018), (describing Amazon and Facebook as part of "unaddressable" web inventory for Google's display business).

[32] Apple and Android smartphones and tablets are examples of mobile devices, and Roku, AppleTV, Amazon's Fire TV, and Google's Chromecast are examples of TV media players.

[33] Philip Kotler and Kevin Lane Keller, *A Framework for Marketing Management*, 6th ed. (Pearson Education, 2016): 122. ("Some people are unaware of the product, some are aware, some are informed, some are interested, some desire the product, and some intend to buy… [M]arketers can employ a marketing funnel to break the market into buyer-readiness stages."). *See also* Deposition of Kristy Kozlowski (Comcast), September 6, 2023, 186:8–186:13 ("Q. And what are the different parts of the [marketing] funnel? A. The top of the funnel would be more brand and awareness driving, the mid-funnel would be more consideration and the lower funnel would be more conversion."); *See also* Amazon Ads, "What is a marketing funnel? How they work, stages, and examples," Amazon Ads, accessed December 18, 2023, https://advertising.amazon.com/library/guides/marketing-funnel (describing a "four-stage marketing funnel" including the stages of "awareness, consideration, conversion, and loyalty.)

textbooks refer to these stages in the context of a *marketing funnel* "to break the market into buyer-readiness stages."[34]

(59) Different forms of advertising are perceived at targeting users who are at different stages of the marketing funnel. As described in a leading marketing textbook, when determining their online marketing strategy, "[a] company chooses which forms of online marketing will be most cost-effective in achieving communication and sales objectives. The options include Web sites, search ads, display ads, and e-mail."[35]

(60) Ad tech companies also recognize the relevance of different ad types to different components of the marketing funnel.[36] For example, Google describes the difference between search ads and display ads in their role in the marketing funnel as follows:

> While the Search Network can reach people when they're already searching for specific good or services, the Display Network can help you capture someone's attention earlier in the buying cycle. You can put your ads in front of people before they start searching for what you offer, which can be key for your overall advertising strategy.[37]

II.A.3. Audience targeting

(61) Compared to offline advertising, digital advertising offers advertisers a greater ability to engage in detailed "audience targeting." For example, while a print advertisement or traditional television commercial might be shown to all readers of a magazine or all viewers of a television program, a given website can show different display ads to different "targeted" users.

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34 Philip Kotler and Kevin Lane Keller, *A Framework for Marketing Management*, 16th ed. (Pearson Education, 2016): 122 (A consumer's purchase journey need not be linear, as a consumer may revisit stages or proceed in a different ordering prior to making a purchase. The effectiveness of different forms of advertising will still vary depending on an advertiser's objective and the consumer's awareness, interest, and desire).

35 Philip Kotler and Kevin Lane Keller, *A Framework for Marketing Management*, 16th ed. (Pearson Education, 2016): 275.

36 For instance, John Dederick, Executive Vice President and Chief Client Officer at The Trade Desk, testified that "not every [advertising] channel could just be easily switched out for the others" because advertisers use different types of advertising to reach users at different stages of the marketing funnel. For example, "[a]dvertisers rely really clearly on television and premium video for building awareness and favorability and pretty clearly on things like Search and Social for driving ongoing purchase." (Deposition of John Dederick (The Trade Desk), Jul. 28, 2023, 228:22–230:2).

37 Google, "About Display ads and the Google Display Network," Google Ads Help, accessed December 18, 2023, https://support.google.com/google-ads/answer/2404190. *See also* Figure 28 in Section IV.B.2.a.

Google emphasizes the benefits of using display and search advertising together, stating "a Search Network campaign with Display Expansion increases your reach" and can help advertisers gain "additional impressions and conversions," and "grow your potential audience." Google Ads Help, "About Display Expansion on Search campaigns," Google Ads Help, accessed December 19, 2023, https://support.google.com/google-ads/answer/7193800?hl=en&ref_topic=10543918&sjid=2955664926464503505-NA.

(62) To facilitate audience targeting with display ads, data are collected from various ad tech intermediaries and organized using "cookies" and other user identification techniques.[38] Using these data, advertiser- and publisher-facing technologies can build comprehensive user profiles that can assist advertisers with showing their ads only to users satisfying certain criteria. Publishers also benefit with improved targeting as advertisers are willing to pay more for ad inventory that reaches users who are more likely to take an action based on viewing their advertisement.[39] An example of this targeting behavior occurs when a company may know that the consumer has visited its website previously, and the company purchases "retargeting" display ads that appear on other web sites that the consumer subsequently visits. More generally, while some display ads may be shown to everyone who visits a website, other ads may only be shown to selected consumers depending on their behavior, demographics (including location), or browsing context.

(63) I discuss companies' ability to use data to improve ad targeting in more detail in Section III.D.[40]

II.A.4. Types of display advertising transactions

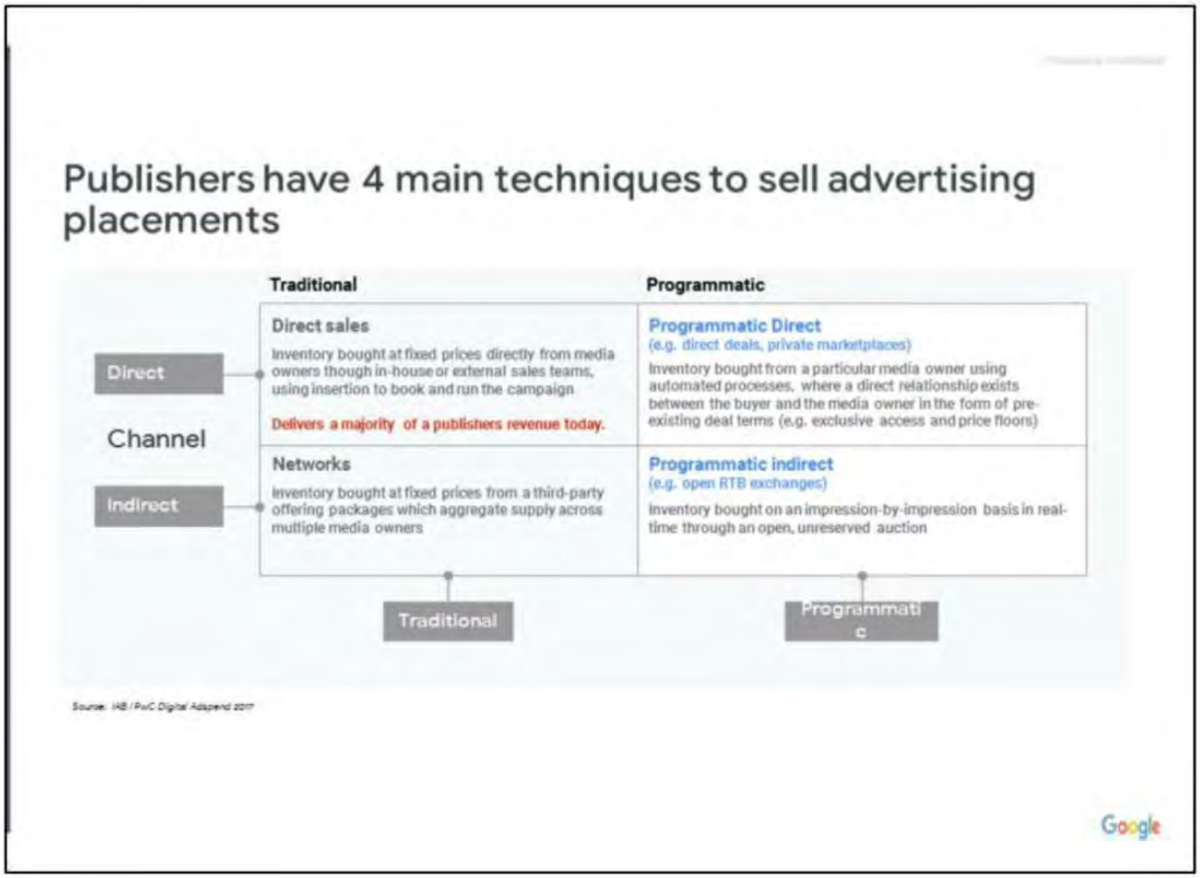
(64) There are different ways in which publishers can sell their display ad inventory to advertisers. At the broadest level, display advertising transactions can be classified as *direct* or *indirect*. Figure 13 below presents a summary from an internal Google presentation that distinguishes between direct and indirect as well as between "programmatic" and traditional (or "non-programmatic") transactions.

[38] "Cookies" are pieces of text that are sent from websites that a user visits to their browser which allow websites to track information about the user, their behavior across websites, and can help to identify unique users across browsing sessions. These can be used to store user preferences and behavior on sites to be used for purposes like ad targeting. *See* Google, "Google Advertising Terms," Google Privacy and Terms, accessed December 18, 2023, https://policies.google.com/technologies/ads; Google, "Cookie and user identification," Google Security and Privacy, accessed December 18, 2023, https://developers.google.com/tag-platform/security/concepts/cookies.

[39] Deposition of Nirmal Jayaram (Google), September 17, 2021, 58:2–59:3 ("Q[.] How does user information factor into the bid optimization level? A: It is used for predicting whether the user would click or convert, and depending on what the advertiser would want, and the information we have about the user would factor into that prediction….A[.]: The user information is one of the signals that would help understand whether the advertiser desired action is likely the author. Q[.] If the user is likely to take more -- if the user is more likely to take the desired action, would you pay more for that impression? A[.] If the user is more likely to take the desired action, the bid would typically be higher.").

[40] This discussion also illustrates why, within display advertising, display ads shown on open-web publishers provide advertisers value by allowing them to track and target users across multiple websites. I discuss distinctions between advertising on open-web publishers and on those using integrated advertising tools in Section IV.B.2.b.

Figure 13. Google explanation of display advertising transaction types



Source: GOOG-DOJ-03242646, at -670 (09/26/2018).

(65) **Direct transactions** refer to those that are subject to terms individually and "directly" negotiated between publishers and advertisers.[41] Direct transactions that utilize sales teams and require manually recording deal terms are referred to as "traditional tag-based" or "non-programmatic direct" deals, while those that rely on automation or ad tech products are referred to as "programmatic direct."[42] *Programmatic* refers to "media or ad buying that uses technology to automate and optimize, in real time, the ad buying process."[43] Programmatic direct transactions can either reserve ad inventory that

[41] Google, "Delivery basics: Ways of transacting in Ad Manager," Google Ad Managers Help, accessed on December 18, 2023, https://support.google.com/admanager/answer/9248464.

[42] GOOG-DOJ-03242646, at -670 (09/26/2018) (defining Programmatic Direct as "[i]nventory bought from a particular media owner using automated processes, where a direct relationship exists between the buyer and the media owner in the form of pre-existing deal terms"); GOOG-DOJ-AT-02199478, at -525 (06/2019); Google, "Get started with Programmatic Direct," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/6239618.

[43] *See* Interactive Advertising Bureau, "Glossary of Terminology," Interactive Advertising Bureau, accessed December 18, 2023, https://www.iab.com/insights/glossary-of-terminology/. *See also* GOOG-DOJ-03242646, at -669 (09/26/2018) ("Programmatic advertising is the automation of buying and selling of digital advertising").

is guaranteed for a buyer ("Programmatic Guaranteed"), or give the buyer a "preferred" option to buy the inventory ("Preferred Deals"), as described in more detail below.[44]

(66) **Indirect transactions** allow open-web publishers to sell remaining ("remnant") ad space on a page not allocated to direct deals to advertisers using ad tech products. Indirect transactions happen during the short period of time when a user loads a website. Indirect transactions can occur through auctions. These auctions can be conducted only among a publisher-approved set of advertisers (known as a "Private Auction", which are sometimes facilitated through a "Private Marketplace")[45] or a wider set of potential advertisers (known as an "Open Auction").[46] Indirect transactions sold through auctions are categorized as programmatic.[47]

(67) As I discuss further below in Section II.B.1, one of the primary features offered by a publisher ad server is its ability to assist a publisher managing the sale of display inventory using different transaction types.[48] Figure 14 below provides a depiction of how Google has categorized different transaction types for display advertising. I describe each of these in more detail below.

44 Google, "Programmatic Guaranteed vs. Preferred Deals," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/7637485; Google, "Transaction types," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/7637485; Google, "Transaction types," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/2805834. *See also* GOOG-DOJ-AT-02199478, at -527 (05/18/2020) (defining preferred deal as "direct deal between publisher and buyer at a selected price, evaluated before the private and open auctions, if the buyer bids agreed price, it buys the impression even if auctions might have a higher bidder. Buyer does not need to buy the impression.").

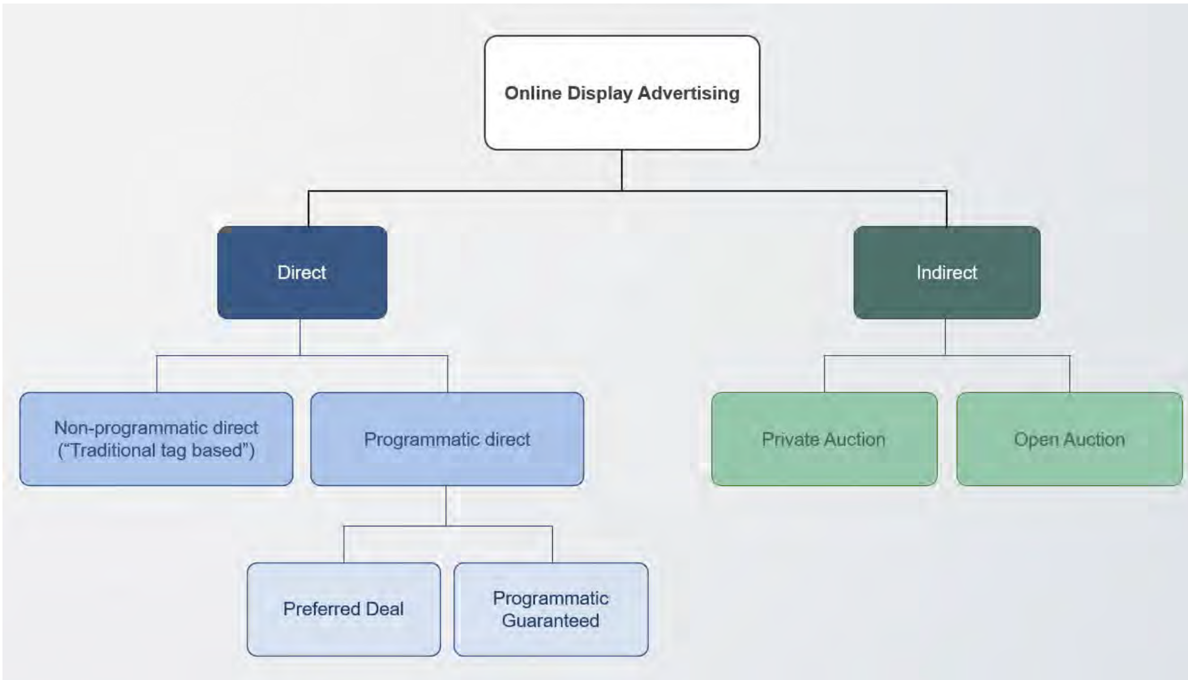
45 GOOG-AT-MDL-008544607, at -614 (05/18/2023).

46 Google, "Transaction types," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/2805834.

47 Google, "Ways of transacting in Ad Manager," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/9248464. (Some documents reference traditional networks, which sell previously unsold remnant inventory at pre-defined prices, as "indirect"). GOOG-DOJ-03242646, at -689 (09/26/2018) (In 2017 non-programmatic indirect transactions had an "Industry Average Ad Spend" of 2% as compared to 17% for programmatic indirect transactions).

48 For example, when an online display impression becomes available for sale, a publisher's ad server decides how to prioritize different transaction methods. Programmatic Guaranteed deals typically share the highest priority with (non-programmatic) direct deals, and are tracked via Deal IDs, which uniquely identify an arrangement made between a publisher and an advertiser beforehand and allow the publisher to treat it according to the negotiated contract terms. *See, e.g.,* Google, "Line item types and priorities," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/177279; Google, "Programmatic Guaranteed vs. Preferred Deals," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/7637485. *See also* Interactive Advertising Bureau UK, "The Programmatic Handbook," Interactive Advertising Bureau UK, September 2014 https://www.iabuk.com/sites/default/files/The%20Programmatic%20Handbook.pdf, 35.

Figure 14. Transaction types for online display advertising used by Google



Source: Chart created using information from GOOG-DOJ-AT-02199478, at -525-27 (06/2019); GOOG-DOJ-03242646, at -670 (09/26/2018); "Get started with Programmatic Direct," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/6239618; Google, "Ways of transacting in Ad Manager", Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/9248464.

II.A.4.a. Direct transactions

(68) As stated above, in direct deals, inventory is transacted via terms arising from one-on-one negotiations between a publisher and an advertiser and can be facilitated either manually ("non-programmatically") or programmatically through ad tech products.

(69) In **non-programmatic direct** negotiations, the publisher and advertiser negotiate and agree on the terms of the deal, the advertisement is then sent to the publisher (e.g., via email), the publisher manually uploads the advertisement to its publisher ad server (the platform that hosts the publisher's ad inventory), and the publisher ad server serves the advertisement on the publisher's website.[49] Billing, payments, and reconciliation are handled manually by the publisher and advertiser.

(70) Whereas non-programmatic direct deals primarily involve manual negotiation and deal execution, programmatic direct automates many aspects of this process, allowing publishers to "negotiate direct-sold campaigns while taking advantage of programmatic technology."[50] With programmatic direct,

[49] Maciej Zawadziński, "Understanding RTB, Programmatic Direct and Private Marketplace," Clearcode, April 13, 2018, https://clearcode.cc/blog/rtb-programmatic-direct-pmp/. *See also* GOOG-DOJ-AT-02199478, at -527 (06/2019).

[50] Google, "Ways of transacting in Ad Manager," Google Ad Manager Help, accessed December 18, 2023,

publishers can choose to either directly negotiate with advertisers or offer fixed prices for inventory, and advertisers can either accept or not accept the price and terms set by the publisher.[51] Billing, payment, and reconciliation functions in programmatic direct are handled by ad tech intermediaries.[52]

(71) Within **programmatic direct** transactions are Programmatic Guaranteed and Preferred Deals:

- In **Programmatic Guaranteed** deals, one advertiser and one publisher agree on a fixed price for ad inventory that is then reserved (guaranteed) for the given buyer.[53] Such deals may allow publishers to "command higher rates for their premium inventory," while advertisers are able to secure the premium space for their campaigns.[54]
- For **Preferred Deals**, a publisher and an advertiser negotiate on the price for inventory that the advertiser can optionally buy. The advertiser has a "preferred" opportunity to buy the inventory at the negotiated price when there is an ad request for that specific inventory, but is not committed to do so; moreover, the inventory is not guaranteed to be available for the advertiser.[55] If the advertiser bids at the agreed-upon price when the inventory becomes available, it beats any open auction or private auction bids, even if those bids exceed the Preferred Deal advertiser's bid.[56] If the advertiser chooses not to secure the inventory, it is then available to open auction and private auction bids. Publishers may prefer Preferred Deals over indirect transactions because the fixed price helps them "protect their yield," ensuring that certain ad slots are not sold for too low a price.[57] According to a Google document, Preferred Deals provide advertisers with an additional

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https://support.google.com/admanager/answer/9248464.

51 Maciej Zawadziński, "Understanding RTB, Programmatic Direct and Private Marketplace," Clearcode, April 13, 2018, https://clearcode.cc/blog/rtb-programmatic-direct-pmp/.

52 Google, "Ways of transacting in Ad Manager," Google Ad Manager Help, accessed December 18, 2023, 2023, https://support.google.com/admanager/answer/9248464.

53 Google, "Programmatic Guaranteed vs. Preferred Deals," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/7637485; Interactive Advertising Bureau, "Standardizing programmatic terminology with the IAB," Interactive Advertising Bureau, April 23, 2014, https://www.iab.com/news/standardizing-programmatic-terminology-iab/ ("These are the most like traditional [non-programmatic] direct ad buys but are now handled automatically.").

54 Interactive Advertising Bureau, "Standardizing programmatic terminology with the IAB," Interactive Advertising Bureau, April 23, 2014, https://www.iab.com/news/standardizing-programmatic-terminology-iab/; GOOG-AT-MDL-008544607, at -618 (05/18/2023) ("[With Programmatic Guaranteed], publishers can segment their most valuable inventory and help advertisers tap into sought after audiences.").

55 Google, Programmatic Guaranteed vs. Preferred Deals," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/7637485; GOOG-DOJ-AT-02199478, at -527 (06/2019).

56 GOOG-TEX-00058961, at -961 (01/25/2017); GOOG-DOJ-AT-02199478, at -527 (06/2019). According to Google Ad Manager's support website, when there are multiple Preferred Deals targeting the same inventory at the same price, Ad Manager chooses the winning buyer at random. Google, Programmatic Guaranteed vs. Preferred Deals," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/7637485.

57 Interactive Advertising Bureau UK, "The Programmatic Handbook," Interactive Advertising Bureau UK, September 2014, https://www.iabuk.com/sites/default/files/The%20Programmatic%20Handbook.pdf, 34.

flexibility to purchase ad inventory that meets their campaign goals without an "upfront commitment."[58]

(72) Certain publishers may prefer to sell at least part of their inventory through direct deals. These reflect "[r]eserved [i]mpressions" with "[p]remium placements and formats" and high rates that "reflect the value of [the] most premium inventory."[59] As I show in Section IV.B.4, in 2022, publishers using Google's publisher ad server sold roughly 14% of their impressions through direct deals.[60]

II.A.4.b. Indirect transactions and real-time bidding ("RTB")

(73) Indirect transactions fulfilled through auctions emerged in the late 2000s as an alternative way for publishers to fill remnant or otherwise unsold inventory, allowing a larger pool of buyers to bid on available ad space in "real-time."[61] Auctions involved participants engaging in *real-time bidding* ("RTB"), whereby ad inventory could be sold at variable prices whenever a user visited a webpage and impressions became available for sale.[62] Prior to real-time bidding, publishers were able to sell indirect remnant inventory on a fixed-price basis.[63] As shown in a Google presentation in Figure 15 below, real-time bidding provided advantages over advertising that had previously been "[b]ought in advance, in bulk, and at a set price."[64]

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58 DoubleClick by Google, "The buyer's guide to Programmatic Direct," Double Click by Google, accessed on December 18, 2023, https://www.thinkwithgoogle.com/_qs/documents/717/canadian-buyers-guide-to-programmatic-direct.pdf, 12 (describing an example where an advertiser targeting a certain demographic group identifies websites that complement its campaign, but, only a small fraction of these websites' visitors meets the targeting criteria).

59 GOOG-AT-MDL-008544607, at -613–615, -634, -665 (05/18/2020).

60 DRX Internal Stats data (DOJ RFP 57). *See* Figure 31 in Section IV.B.4.

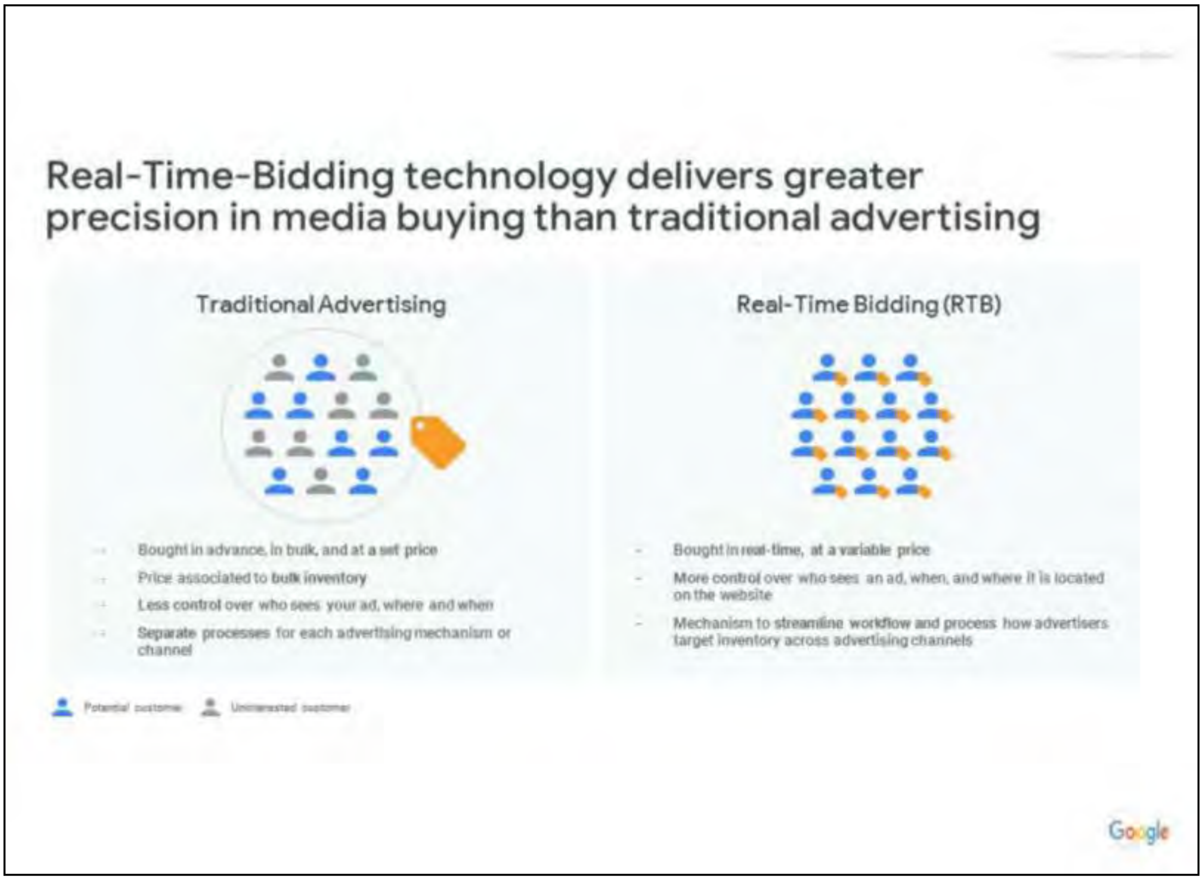
61 Maciej Zawadzinski and Mike Sweeney, "Understanding RTB, Programmatic Direct and Private Marketplace," Clearcode, April 13, 2018, https://clearcode.cc/blog/rtb-programmatic-direct-pmp/. *See also* GOOG-DOJ-03242646, at -664–667 (09/26/2018).

62 In my report, I use real-time bidding (RTB) to refer to the process by which a demand source is able to submit a bid for publishers' ad inventory at the impression (or "query") level and is not restricted to being able to purchase inventory at a predetermined price. For example, an open-web display transaction can involve RTB if real-time bids from various demand sources (e.g., from DSPs and advertiser ad networks within an ad exchange, or from ad exchanges within a publisher ad server) are sourced simultaneously. Although real-time bids can be sourced sequentially in a "waterfall" setup (see Section II.E.1), demand sources that are not called upon in a waterfall are not able to engage in RTB (and are instead, e.g., evaluated using a historical or static price). This is consistent with how Google uses the term (*see* GOOG-DOJ-03242646, at -664–65, describing real-time bidding as "the buying and selling of online media through real-time auctions" and "bought in real-time, at a variable price.").

63 GOOG-DOJ-03242646, at -670 (09/26/2018).

64 GOOG-DOJ-03242646, at -665 (09/26/2018).

Figure 15. RTB compared to traditional bulk purchases



Source: GOOG-DOJ-03242646, at -665 (09/26/2018).

(74) Because the number of visitors to a publisher's website in a given time period can be uncertain, indirect transactions assisted publishers with addressing "underfilling"—failing to fill all available ad inventory space—and "overfilling"—selling more ad space than was available.[65] Indirect transactions do not require publishers to forecast the amount of demand their website is expected to receive, and instead enables them to sell impressions as they become available. Since indirect transactions sold via RTB involve the sale of individual impressions, advertisers are able to also target consumers and place real-time bids on the basis of user interests or demographics.[66]

(75) Industry participants recognize two types of auctions used to transact display ads, depending on whether the publisher places restrictions on the set of bidders. In **Private Auctions** (also referred to as

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[65] A 2014 Google document describes the historic role of ad networks as "aggregat[ing] inventory and [selling] to advertisers", which "[h]elped publishers by selling inventory that they could not sell themselves." *See* GOOG-AT-MDL-006334784, at -791 (09/03/2014).

[66] The introduction of RTB allowed advertisers to "[t]arget and buy only the advertising they want, at an appropriate value, and in 'real-time'" (GOOG-DOJ-03242646, at -666 (09/26/2018).

private marketplace), publishers use a private (invitation-only) auction open to specific buyer(s) and, as such, control which advertisers are able to bid on their ad inventory. This transaction format allows publishers to offer ad inventory to selected buyers, while still incorporating the benefits of RTB.[67] In **Open Auctions**, publishers allow a wider range of buyers to bid on their ad inventory.[68] Since the auction is open to a larger set of buyers, this format can increase yield and result in higher fill rates for remnant inventory. Bids from the Open Auction may compete with bids from the Private Auction either (1) concurrently if enabled by the publisher, or (2) subsequently if the available ad inventory is not filled in the Private Auction.[69]

II.A.4.c. Display advertising spending across transaction types

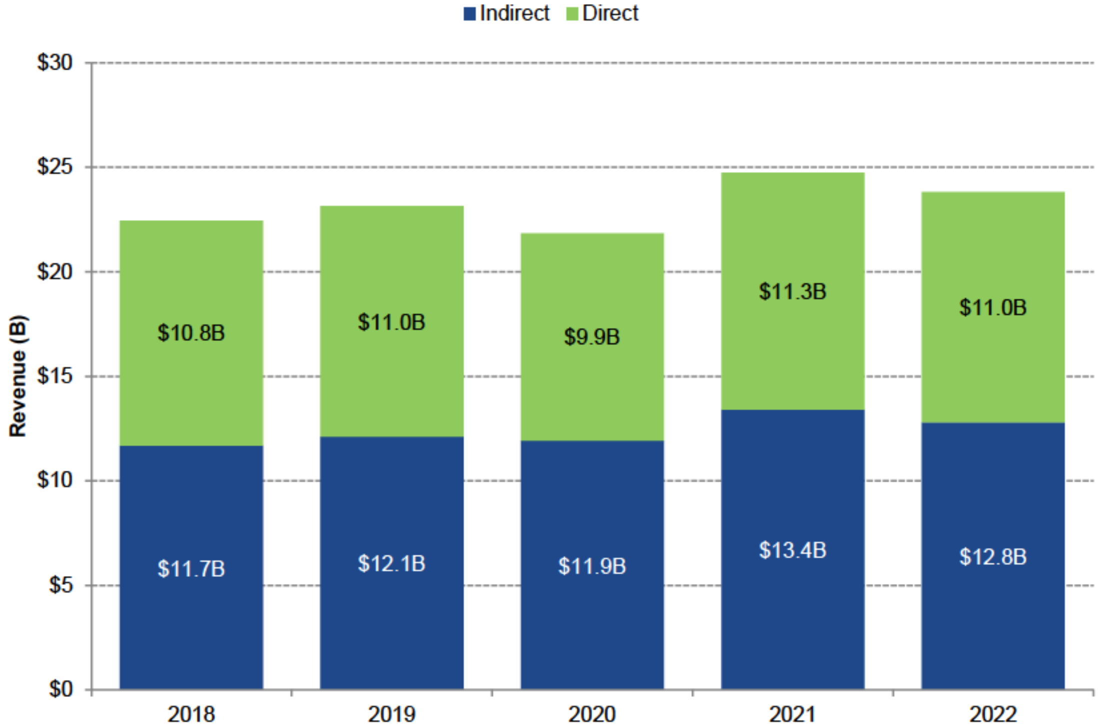
(76) Indirect transactions comprise a substantial proportion of total open-web display advertising transactions, both in terms of total spend as well as in impressions sold. Figure 16 shows trends in total spend on open-web display advertisements. Between 2018 and 2022, overall spend on indirect transactions grew by 10%. Over the same period, spend on direct transactions remained relatively steady.

[67] *See* AppsFlyer, "Real-time bidding (RTB)," AppsFlyer, accessed December 15, 2023, https://www.appsflyer.com/glossary/real-time-bidding/. Publishers usually select advertisers for Private Auctions using their publisher ad servers. For example, Google Ad Manager, Google's publisher ad server and exchange, allows publishers to select "verified advertisers" from a database of advertisers, and publishers can then allow only these advertisers to participate in a Private Auction. Google, "Google Ad Manager Help," Google Ad Manager, accessed December 16, 2023, https://support.google.com/admanager/answer/6084608.

[68] Google, "Transaction Types," Google Ad Manager, accessed December 16, 2023, https://support.google.com/admanager/answer/2805834.

[69] Google, "Auction Model," Google Ad Manager, accessed December 16, 2023, https://support.google.com/admanager/answer/152039;Google, "Private Auctions," Google Ad Manager, accessed December 16, 2023, https://support.google.com/admanager/answer/10863708.

Figure 16. Worldwide indirect and direct open-web display advertising spend on Google DoubleClick for Publishers ("DFP")



Source: DRX Internal Stats data (DOJ RFP 57).
Note: Original data report reservation types. Impressions displayed are viewed impressions. Impressions are limited to open-web display advertisements. Sponsorship and standard reservations are considered direct sales. Price priority, network, bulk, and bumper reservations as well as transactions through AdX are considered indirect sales. House ads and unknown reservation type are excluded. Analysis excludes outlier transactions with greater than $100 CPM and those with $0 revenue. Transactions are limited to cost types paid out in CPM.

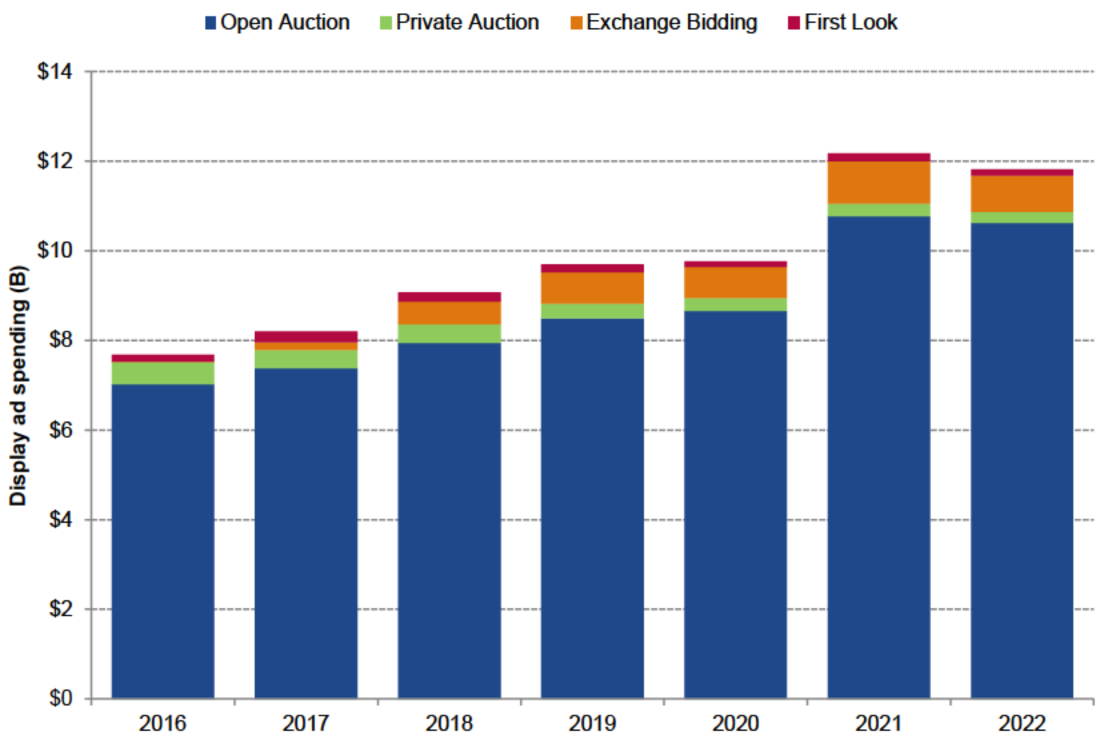
(77) There has also been growth in the use of programmatic methods to transact display advertising. Online display advertising transactions have shifted significantly from non-programmatic to programmatic methods in recent years. Market research firm eMarketer estimates that the share of US digital display ad spending on programmatic ads (both direct and indirect) has grown from 14% in 2012 to 89% in 2021.[70]

(78) Data on worldwide transactions through Google's AdX and AdSense ad tech products (described further below) shows the growth in spending on indirect programmatic web display advertising between 2016 and 2022 (see Figure 17).[71]

[70] US programmatic digital display ad spending data (eMarketer).

[71] While Google's AdX can facilitate some programmatic direct deals, these products primarily facilitate RTB indirect transactions, which are mostly open auction. As I note in Section II.A.4.a above, a significant proportion of direct deals are facilitated non-programmatically. *See* GOOG-DOJ-03242646, at -670 (09/26/2018).

Figure 17. Worldwide indirect programmatic spending on open-web display advertising by transaction type through Google's AdX and AdSense products (2016–2022)



Source: Google XPP-M data (DOJ RFP 7).
Notes: Revenues are limited to web transactions through Google's AdX and AdSense and exclude transactions with "missing" or "unknown" transaction types. "Open Bidding" or "Exchange Bidding" is a program introduced by Google (described in more detail in Section II.E.4) and can include both Open Auctions as well as Private Auction transactions. First Look is a Google product that publishers can use to sell inventory ahead of its guaranteed inventory.

II.B. Ad tech products used for web display advertising

(79) Multiple ad tech products, or "components," are used by publishers and advertisers to serve, manage, and transact display advertising.

(80) Figure 18, based on a June 2020 Google presentation, provides a simplified depiction of the primary ad tech components. Publishers (i.e., sellers) are on the left-hand side, advertisers (i.e., buyers) are on the right-hand side, and ad tech products are in the middle. The diagram shows different sets of ad tech products, including publisher ad servers, ad exchanges, advertiser ad networks, and demand-side platforms. The diagram also highlights Google's products, which I discuss further in Section II.C.

additional valuable impressions to bid on, and publishers will more likely be able to sell the impressions generated by visitors on their webpages. Having more options available to advertisers and publishers will also tend to increase competition among ad tech products to provide higher quality services at lower prices.

(84) In this subsection I describe the functionality of the highlighted ad tech components in Figure 19 (publisher ad servers, DSPs, advertiser ad networks, and ad exchanges). I provide more detail about Google's specific offerings in Section II.C.[75]

II.B.1. Publisher ad servers

(85) Publisher ad servers are software products, often centrally hosted and accessed over the internet, used by publishers to facilitate the management and sale of display ads across different demand sources (e.g., ad networks and ad exchanges) and transaction types (e.g., direct and indirect deals).[76] While in

[75] Advertisers and publishers also use a number of peripheral products to assist in the development of advertising content and to manage their data. Two examples of these products are advertiser ad servers and data management platforms ("DMPs").

Advertiser ad servers are software products used by advertisers to serve, manage, and track their ad campaigns across websites and applications. They help share the chosen creative with publishers and monitor user clicks, conversions, and other relevant metrics across publishing platforms. IAB, Glossary of Terminology," IAB, accessed December 16, 2023, https://www.iab.com/insights/glossary-of-terminology/; Ankit Oberoi, "What is an ad server and how does it work?" https://www.adpushup.com/blog/the-ultimate-guide-to-ad-servers/. Companies such as Adform, Google and Sizmek operate advertiser ad servers. *See* Adform, "The Adform Ad Server," Adform, accessed December 18, 2023, https://site.adform.com/products/integrated-advertising-platform/ad-serving/; Google, "Overview of Campaign Manager 360," Campaign Manager 360 Help, accessed December 18, 2023, https://support.google.com/campaignmanager/answer/2709362; Delacon, "Sizmek MDX," Delacon, accessed December 18, 2023, https://www.delaconcorp.com/integrations/third-party-ad-server/sizmek-mdx/.

DMPs are software products that collect, store, and organize advertising-related data for advertisers, publishers, and other intermediaries for the purposes to improving ad targeting and conducting advanced analytics. *See* Maciej Zawadziński and Mike Sweeney, "What is a Data Management Platform (DMP) and How Does it Work?" Clearcode, May 21, 2015, https://clearcode.cc/blog/data-management-platforms/. DMPs combine data from their customers (publishers or advertisers, usually via their ad servers), with data from other significant players in the advertising industry, and broad data aggregators. *See* Lotame, "First-Party Data, Second-Party Data, Third-Party Data: What Does It All Mean?" Lotame, last modified November 16, 2023, https://www.lotame.com/1st-party-2nd-party-3rd-party-data-what-does-it-all-mean/. Other than Google, companies such as Adobe, Lotame, Nielsen, and Oracle operate DMPs. Adobe Experience Cloud, "Building an experience business starts with an experience-based DMP," Adobe Experience Cloud, accessed December 21, 2023, https://www.adobe.com/experience-cloud/topics/data-management-platform-dmp.html; Lotame, "What is a Data Management Platform (DMP)?" Lotame, last modified November 14, 2023, https://www.lotame.com/what-is-a-data-management-platform/; Nielsen, "Modernize for the future for smarter and more effective marketing," Nielsen, accessed December 21, 2023, https://www.nielsen.com/solutions/media-planning/marketing-cloud/; Oracle, "Oracle BlueKai Data Management Platform," Oracle, accessed December 21, 2023, https://www.oracle.com/cx/marketing/data-management-platform.
Other products used by advertisers include creative suites, which help advertisers build advertisements, and media planners, which help advertisers plan their advertising campaigns.

[76] Industry participants have referred to publisher ad servers as a "software-as-a-service" (SaaS) product, i.e., a product in which software is centrally hosted and licensed to users to access online. Alise Zaiceva, "What is an Ad Server? A Complete Guide for Publishers," SETUPAD Blog, January 9, 2023, https://setupad.com/blog/ad-server/. Publisher ad servers may also be able to handle the sale of non-display (e.g., instream video) or in-app display advertising. *See* Deposition of Jeremy Helfand (Disney), September 29, 2023, 132:3–132:8 ("Q. And just so I'm clear, does Disney still use Google's DFP ad server to sell video advertising outside of Hulu and Disney+? A. The Google Ad Manager, previously DFP, is used to deliver video advertising on some of our properties like ESPN.").

principle a publisher could sell ad inventory to a narrower set of buyers without a separate ad server, a publisher ad server allows a publisher to manage a wider range of demand sources and transaction types, as I discuss in Section IV.C.1.

(86) A publisher using a publisher ad server is able to divide its webpage into ad units, which are spaces in which an ad can be displayed.[77] One key feature of publisher ad servers is their ability to choose between indirect sources, such as ad exchanges, and other monetization sources, such as direct deals, to fulfill a particular advertising opportunity in real-time, according to priorities and requirements put in place by the publisher through its publisher ad server.[78] This functionality is particularly important for large publishers or those with more complex needs: for example, publishers who need to meet the pricing and scheduling requirements of direct deals while simultaneously seeking to allocate remaining inventory via indirect transactions in a manner that most effectively monetizes their display inventory.[79] Publisher ad servers also provide useful monitoring and reporting capabilities to help publishers track their monetization performance through metrics such as impressions, clicks, and expected payout rates.[80]

(87) Below, in Section II.C.1, I provide more details about how publisher ad servers work.

(88) Publishers rarely if at all use multiple publisher ad servers for selling web display inventory.[81] In addition, publishers rarely switch publisher ad servers due to significant switching costs.[82]

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[77] *See, e.g.,* Google, "Get Started with ads in Google Ad Manager," Google Ad Manager, accessed December 16, 2023, https://support.google.com/admanager/answer/6027116?hl=en&ref_topic=7506292.

[78] Publisher ad servers also provide ad serving technology and revenue optimization among other functions (e.g., billing and performance tracking) to publishers. *See* Deposition of Scott Sheffer (Google), July 20, 2021 80:15–81:22 ("What a [publisher] ad server enables a publisher to do is, subject to the publisher's decisions around pricing and scheduling and budgeting, the ad server enables them to run their monetization business according to the rules and the criteria and the setup that the publisher puts in place with that ad server."); *see also* Deposition of Max Loubser (Google), April 21, 2021, 167:3–167:20, ("Q. Focusing specifically on the reference to decision logic, how did header bidding present a challenge to DFP with respect to decision logic? A. … The decision logic typically refers to the process of the DFP ad server selecting which advertisement to deliver to the publisher's web page or other environment. And in order to make a good decision, where a good decision is one that would be optimal for the revenue of the publisher and then, again, as before, the advertiser's interests and the user's interests.").

[79] *See* Deposition of Scott Sheffer (Google), July 20, 2021, 79:19–84:3 ("[A] typical publisher has a chunk of advertising inventory that they would like to monetize… The challenge for a publisher is that they have typically a direct sales team, which may sell some of that inventory directly at negotiated rates that they do with an advertiser agency. And then they may have other inventory that a publisher may wish to monetize. What an ad server enables a publisher to do is, subject to the publisher's decisions around pricing and scheduling and budgeting, the ad server enables them to run their monetization business according to the rules and the criteria and the setup that the publisher puts in place with that ad server.").

[80] ATT-GCID-00000183, at -184 (03/06/2019).

[81] *See* Section III.C. *See also* Deposition of Andrew Casale (Index Exchange), September 26, 2023, 111:18–112:25 ("Q. How common is it for a publisher to utilize more than one publisher ad server? … It's not – it's very rare. That hardly every happens...A. Common across channel, so a publisher might opt to use an ad server for web display and a different ad server for video. I don't think publishers ever use two ad servers for one channel, so I don't think publishers would ever use two ad servers for web display.").

[82] *See* Section III.C. *See also* GOOG-DOJ-01657697, at -833 (03/14/2007);GOOG-TEX-00076049, at -049 ("Ad Servers

a DSP, advertisers can construct campaigns to target particular groups or users (for example, parents in Virginia who are looking for daycares) and bid across multiple ad exchanges.[95] Advertisers, through their DSP, may have the option of choosing which exchanges to bid into for inventory.[96]

(95) As I discuss in Section III.C, there is evidence that advertisers using DSPs often use more than one.

(96) *DV360*, formerly DoubleClick Bid Manager ("DBM"), is Google's DSP. Other companies that offer or have offered DSP products are Adobe,[97] Amazon,[98] The Trade Desk,[99] Verizon Media,[100] and Xandr.[101]

II.B.2.b. Advertiser ad networks

(97) Similar to DSPs, advertiser ad networks are products that advertisers use to purchase display ad inventory from publishers.[102,103] In contrast to DSPs, advertiser ad networks provide a more managed and automated experience for advertisers and have a much simpler user interface.[104]

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95 DAN000021 at -023 (04/18/2016) ("DBM provides access to extensive 3rd party data and allow advertisers to use their own data through their own DMP"). *See also* Deepak Sharma, "DSP vs. DMP: Differences, Similarities, and Their Hybrid Model," adpushup, March 3, 2023, https://www.adpushup.com/blog/dsp-vs-dmp-differences-similarities-and-their-hybrid-model/.

96 Display and Video 360 Help, "Managing Exchanges," Google DV360, accessed December 16, 2023, https://support.google.com/displayvideo/answer/9230278. *See also* GOOG-AT-MDL-010636992 ("Response of 2 October to EC Questionnaire received on 12 July 2021"), at -006 (10/02/2021) ("In order to bid on an SSP, an advertiser needs to first 'enable' the SSP by going to 'Partner Settings > Basic Details > Exchanges'. In the Exchanges section, the advertiser will see a list of SSPs that are available on DV360. To enable an SSP, the advertiser needs to check the box next to the SSP. This applies to all SSPs, including AdX. That is, to bid on AdX, the advertiser needs to check the box next to Google Ad Manager in the Exchanges section. This is the 'managing exchanges' feature referred to in this question.").

97 Adobe Experience Cloud, "One demand-side platform to rule them all," Adobe Experience Cloud, accessed December 14, 2023, https://www.adobe.com/advertising/demand-side-platform.

98 Amazon Ads, "Amazon DSP," Amazon Ads, accessed December 16, 2023, https://advertising.amazon.com/solutions/products/amazon-dsp.

99 The Trade Desk, "The Trade Desk repeats as top-ranked demand side platform based on Net Promoter Score," Tthe Trade Desk, October 31, 2017, https://www.thetradedesk.com/press-releases/the-trade-desk-repeats-as-top-ranked-demand-side-platform-based-on-net-promoter-score.

100 Yahoo Advertising, "Ad Solutions Worth Yodeling About," Yahoo Advertising, accessed December 16, 2023, https://www.verizonmedia.com/insights/emerging-channels-reach-audiences-in-new-ways-with-our-dsp.

101 Microsoft Advertising, "Xandr," Microsoft Advertising, accessed December 16, 2023, https://www.xandr.com/platform/invest/.

102 Maciej Zawadzinski and Mike Sweeney, "What is an Ad Network and How Does it Work?," Clearcode, March 7, 2018, https://clearcode.cc/blog/what-is-an-ad-network-and-how-does-it-work/. *See also* GOOG-DOJ-14053654. at -659 (08/30/2017).

103 Ad networks, as shown in Figure 19, are often depicted as connecting advertisers and publishers directly, and can have both an advertiser-facing component ("advertiser ad network") and a publisher-facing component. As noted above, Google Ads is the advertiser-facing component of Google's GDN network; AdSense is the publisher-facing component. I describe AdSense in further detail in Section II.C.3.b below.

104 In his deposition, Eisar Lipkovitz states, "networks in general have a very simple UI…where you give us your objective…and the network does everything automatically for your and you get a good outcome". Deposition of Eisar Lipkovitz (Google), March 31, 2021, 88:13—90:2.

(98) Advertiser ad networks historically collected unsold inventory from multiple publishers and re-sold it to advertisers in bulk at prices lower than those achieved through direct deals.[105] Following the rise in popularity of ad exchanges, advertiser ad networks evolved their business model to include providing advertiser access to impressions from ad exchanges via Real Time Bidding ("RTB").[106] Advertiser ad networks in their current form have different ways of facilitating the sale of remnant inventory. Some ad networks—including Google's Display Network, comprising Google Ads and AdSense, for example—purchase inventory for advertisers indirectly either through RTB on an exchange or through its publisher-facing ad network component.

(99) Whereas ad exchanges typically sell ad inventory on a cost-per-thousand-impressions (CPM) basis, many ad networks provide advertisers the ability to pay for their ad purchases on a cost-per-click (CPC) basis.[107] When facilitating purchases through ad exchanges, advertiser ad networks such as Google Ads often convert CPC bids into CPM prices.[108] (See Section IV.E for further discussion on differences between CPM and CPC bidding.)

(100) Advertiser ad networks may lack features provided by DSPs, such as managing multiple ad exchange accounts,[109] but may provide other features including audience targeting, creative generation, and campaign optimization.[110] For example, advertiser ad networks can provide proprietary audience information that they use to assist in targeting for advertiser campaigns.[111] This targeting can be on the basis of location, browser type, and the content of the website.

105 Maciej Zawadzinski and Mike Sweeney, "What is an Ad Network and How Does it Work?," Clearcode, March 7, 2018, https://clearcode.cc/blog/what-is-an-ad-network-and-how-does-it-work/.

106 Jack Marshall, "WTF is an ad exchange," Digiday, January 3, 2014, https://digiday.com/media/what-is-an-ad-exchange/.

107 Google's ad networks (Google Ads, AdSense, and AdMob) and Criteo all use a CPC model for at least some of their transactions. *See also* Section IV.E. *See also* "Cost-per-click (CPC)," *available at* https://support.google.com/admob/answer/3026445?hl=en.

108 [redacted]

109 GOOG-AT-MDL-010636992, at -994 (10/02/2021), GOOG-AT-MDL-010636992at p. 3. ("The function of an ad network is not to enable advertisers to manage multiple ad exchange accounts and bid on properties with which the network has no relationship and cannot assure quality. This is typically the function of a DSP (e.g. DV360). Consistent with its purpose, the Google Ads user interface and functionality is designed with a focus on simplicity and ease of use. It is not designed for purchasing ads across different exchanges.") (emphasis suppressed).

110 IAB, "Glossary of Terminology," IAB, accessed December 16, 2023, https://www.iab.com/insights/glossary-of-terminology/.

111 *See* GOOG-AT-MDL-004522085, at -093 (02/23/2017) (A Google presentation to advertisers on Google Ads noted "One of the best ways to understand Google's unique understanding of user intent is through our targeting options to refine who you define is the 'right audience' for your campaign objectives."). *See also* DAN000021 at -023 (04/18/2016) ("GDN offers Google proprietary audience targeting and contextual targeting capabilities.").

(101) Examples of advertiser ad networks for web display advertising include Google Ads and Criteo.[112] Meta Audience Network (formerly Facebook Audience Network) facilitated advertising transactions to open-web publishers until 2020, when it shifted focus to advertising on Meta O&O properties and select third-party mobile apps.[113]

(102) Ad networks, like Google's Display Network with *AdSense*, may also have a publisher-facing component used by open-web publishers to sell display inventory. I describe AdSense in further detail in Section II.C.3.b below.

II.B.3. Ad exchanges

(103) Ad exchanges (also previously referred to as supply side platforms, or "SSPs") are software products that run real-time auctions for publishers' display ad inventory.[114, 115] Publishers can sell display ads through ad exchanges via a publisher ad server, and advertisers can bid on those impressions using DSPs and advertiser ad networks.

(104) Ad exchanges can improve the matching of impressions between publishers and advertisers, and increase payouts for publishers relative to non-RTB indirect deals by allowing advertisers to bid in real-time.[116] They also provide additional control and targeting to both publishers and advertisers:

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[112] A 2018 Google document describes Criteo as a "[c]ompetitive performance ad network" and lists Facebook Ads (no longer active in open-web display) as the only other display ad network competitor. *See* GOOG-AT-MDL-003977297 ("Buyside Deep Dive") at -312 (03/13/2018). *See* Section V.D.

[113] Allison Schiff, "Facebook is Killing Off Its Web Supply In Audience Network – And Don't Be Surprised If It All Shuts Down," adexchanger, February 5, 2020, https://www.adexchanger.com/platforms/facebook-is-killing-off-its-web-supply-in-audience-network-and-dont-be-surprised-if-it-all-shuts-down/. *See also* Meta, "Changes to Web and In-stream Placements," https://www.facebook.com/business/help/645132129564436; Meta, "Meta Audience Network," https://www.facebook.com/audiencenetwork/ and discussion in Section V.B.2.b.

[114] While previously distinct, SSPs and ad exchanges today are often used to refer to the same set of products. GOOG-DOJ-04429792 ("Monetization Cheatsheet" presentation) at -795 (03/27/2017) ("Sell Side Platform (SSP)/Exchange – service for managing multiple programmatic monetization sources of online display inventory, DSP and ad networks are considered 'Buyers', and publishers and publisher networks are considered 'Sellers'. Google Exchange is called AdX"). *See also* GOOG-DOJ-AT-02199478 ("Ad Manager Ecosystem 101" presentation) at -481(06/2019) ("SSP is a publisher tool that lets them configure rules that (Ad) Exchanges must adhere to on the publisher inventory. For example: publishers can set advertisers they don't want on their sites (for example competitors) and they can set minimum prices for which ads can be bought (to protect direct ad sales)[.] Often SSP and Exchange are bundled as one product and both names are used interchangeably"); Ryan Joe, "Defining SSPs, Ad Exchanges and Rubicon Project," AdExchanger, Feb. 7, 2014, https://www.adexchanger.com/yield-management-tools/defining-ssps-ad-exchanges-and-rubicon-project/ ("The distinction between an ad exchange and a supply-side platform (SSP) has become muddled as the once disparate but complementary technologies have merged."). *See also* Michal Wlosik and Maciej Zawadzinski, "What is a Supply-Side Platform (SSP) and How Does It Work?," Clearcode, October 18, 2018, https://clearcode.cc/blog/what-is-supply-side-platform/.

[115] While certain exchanges such as Google's AdX have begun to facilitate programmatic direct transactions, ad exchanges have primarily fulfilled indirect deals via RTB auctions. In 2022, fewer than 4% of impressions and less than 14% of spend transacted by exchanges that produced data sufficient to identify transaction type in this matter were transacted through direct transactions.

[116] A 2018 Google presentation noted that RTB transactions offered publishers "[h]igher eCPMs" and allowed advertisers to "[t]arget and buy only the advertising they want, at an appropriate value". *See* GOOG-DOJ-03242646, at -666 (09/29/2018).

(107) Examples of ad exchanges include Google's Ad Exchange ("AdX"), PubMatic, Magnite (formerly Rubicon), and Xandr (formerly AppNexus).[123]

II.C. Google's ad tech products

(108) In this Section, I describe Google's publisher ad server, ad exchange, ad network, and DSP products.

- In Section II.C.1, I describe DFP, Google's publisher ad server.
- In Section II.C.2, I describe AdX, Google's ad exchange.[124]
- In Section II.C.3, I describe Google Ads and AdSense, which are the advertiser- and publisher-facing components of the Google Display Network.
- In Section II.C.4, I describe DV360, Google's DSP.

(109) Last, in Section II.C.5, I briefly describe other products that Google owns that facilitates the sale of digital display advertising, including its advertiser ad server, Google Campaign Manager, and its data analytics product, Google Analytics.[125]

II.C.1. DoubleClick for Publishers (DFP)

(110) DFP is Google's publisher ad server, used by publishers to manage, sell, and serve display ads.[126]

[123] Deposition of Tim Craycroft (Google), August 15, 2023, at 90:25—92:6.

[124] In June 2018, Google introduced Google Ad Manager (GAM) which combined DFP and AdX. Jonathan Bellack, "Introducing Google Ad Manager," Google Ad Manager, Jun. 26, 2018, https://blog.google/products/admanager/introducing-google-ad-manager/. *See* Appendix K.1 for further detail on GAM. There is still a distinction between AdX and DFP. *See e.g.,* GOOG-AT-MDL-008842393, at -395 (08/04/2023) ("Up until at least December 2021, it was possible for a publisher using Google Ad Manager to exclude AdX from the sale process altogether."); *see also* GOOG-AT-MDL-000992438, at -438 (05/2022) (2022 Google Presentation, "We have now retired the DoubleClick brand, but internally, the products are still referred to as DFP and AdX."). In my report, I use DFP and AdX to refer to the publisher ad server and ad exchange products within GAM.

[125] I also describe its AdMob product which focuses on in-app advertising,

[126] Historically there have been two versions of DFP (DFP Premium and DFP Small Business) that differed in pricing and features. Currently, GAM 360 and GAM include these products. *See*, *e.g.*, GOOG-AT-MDL-B-003167073, at -074 (08/30/2018). ("Ad Manager is available in two flavors – Ad Manager (formerly DFP Small Business) (~30% of gross media revenue) offers self-serve signups and free ad serving at low volumes; Ad Manager 360 (~70% of gross media revenue) is for major media companies with negotiated contracts.") *See also* Google, "Repost: Publishers are succeeding on DFP," DoubleClick Publisher Blog, October 29, 2012, https://doubleclick-publishers.googleblog.com/2012/10/ ("We announced DFP two years ago with the goal of helping publishers open doors to new revenue. Since then, thousands of our smaller publishers have switched to DFP for Small Business and hundreds of our largest partners to DFP Premium."). *See also* GOOG-DOJ-13218256, at -256 (10/11/2018). ("Over the last 10 years, Google Ad Manager (AM) and Google Ad Manager 360 (AM 360) have converged into almost identical products with little feature differentiation. The few differentiators include data transfer, exchange bidding, teams support, audience features, special ad units, 5-level ad units, and advanced video functionality (full list, pitch deck)."); *See* Section II.D for a description of DFP pricing.

(111) DFP's transaction methods include, for example, Programmatic Guaranteed, Preferred Deals, Open and Private Auction, and non-programmatic direct deals in which the terms are negotiated and finalized outside of DFP.[127]

(112) Publishers can either sell individual ad units or create "placements," which are groupings of similar ad units that publishers bundle together to sell in bulk.[128]

(113) Each ad unit has an associated "tag," which is a line of code that the publisher inserts on one of its webpages. The tag allows a user's web browser to communicate with the publisher's ad server whenever the user visits the publisher's webpage and a display ad impression becomes available.[129] Whenever a user loads a webpage with a tag, the tag sends information to DFP, including,[130]

- The HTTP header, which contains information on the user's browser type, operating system, date and time;
- The user's IP address, which contains the user's geographic location;
- A user identifier, which provides additional information about the user, for example through DoubleClick cookies or a mobile device identifier;
- Custom targeting criteria set by the publisher, such as size and other characteristics of the ad unit, and information about what types of advertisements can appear;

(114) An important role of DFP (and publisher ad servers in general) is deciding which advertisements are displayed on the publisher's webpage. Using the data provided by the tag, DFP references a list of "line items" representing potential advertising sources available to the publisher that the publisher has placed into DFP, and selects those line items that match the targeting criteria set by the publisher which are then "eligible" to be served. Line items contain information about how certain advertisements are intended to serve on the publisher's website or app, and can represent both guaranteed and non-guaranteed deals.[131]

[127] Google, "Ways of Transacting in Ad Manager," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/9248464?hl=en&ref_topic=7506292.

[128] Google, "About Placements," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/177397?hl=en.

[129] Google, "Overview of Google Publisher Tag," Google Ad Manager Help, accessed https://support.google.com/admanager/answer/181073?hl=en&ref_topic=4390039&visit_id=637345059942282309-4157743706&rd=1.

[130] Google, "Overview of Google Publisher Tag," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/1143651?hl=en&ref_topic=7506292.

[131] Google, "About line items," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/9405477?hl=en&ref_topic=7506394. *See also* Google Ad Manager Help, "Ad selection white paper," Google Ads Manager Help, https://support.google.com/admanager/answer/1143651?hl=en&ref_topic=7506292.

(115) For example, if a publisher negotiates a direct deal with an advertiser, the publisher entering that deal into DFP would create line items reflecting the number of times the advertisement(s) are meant to be served, the cost negotiated for the campaign, the start and end times of the campaign, and any targeting criteria set by the advertiser.[132] DFP then uses a priority system in its determination of which ad to serve, where priority levels range from 1 (highest priority) to 16 (lowest priority) based on the line item's characteristics.[133]

(116) Figure 20 and Figure 21 depict and describe various line item types and their priorities within DFP. An important distinction is whether line items are *guaranteed* or *non-guaranteed.*

(117) **Guaranteed line items.** Publishers may negotiate guaranteed *sponsorship* deals, which typically are required to be delivered within a short time frame and have the highest priority.[134] One 2016 Google presentation provides an example of a sponsorship deal in which an advertiser temporarily takes over a website's homepage to display ads for an imminent movie release.[135] Lower priority *standard* line items make up the remainder of guaranteed deals; these have a more flexible, set time frames and may entail additional targeting or custom formats.[136]

(118) **Non-guaranteed line items.** For non-guaranteed line items, publishers select either *network*, *bulk*, or *price priority* based on their delivery goals as described in Figure 20.[137] A publisher can also rely on "house" ads, generally used by the publisher to advertise its own products and services, as the lowest priority line item to display if no higher priority ad is served.

[132] Google, "About line items," Google Ads Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/9405477?hl=en&ref_topic=7506394.

[133] Google, "Line item types and priorities," Google Ads Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/177279.

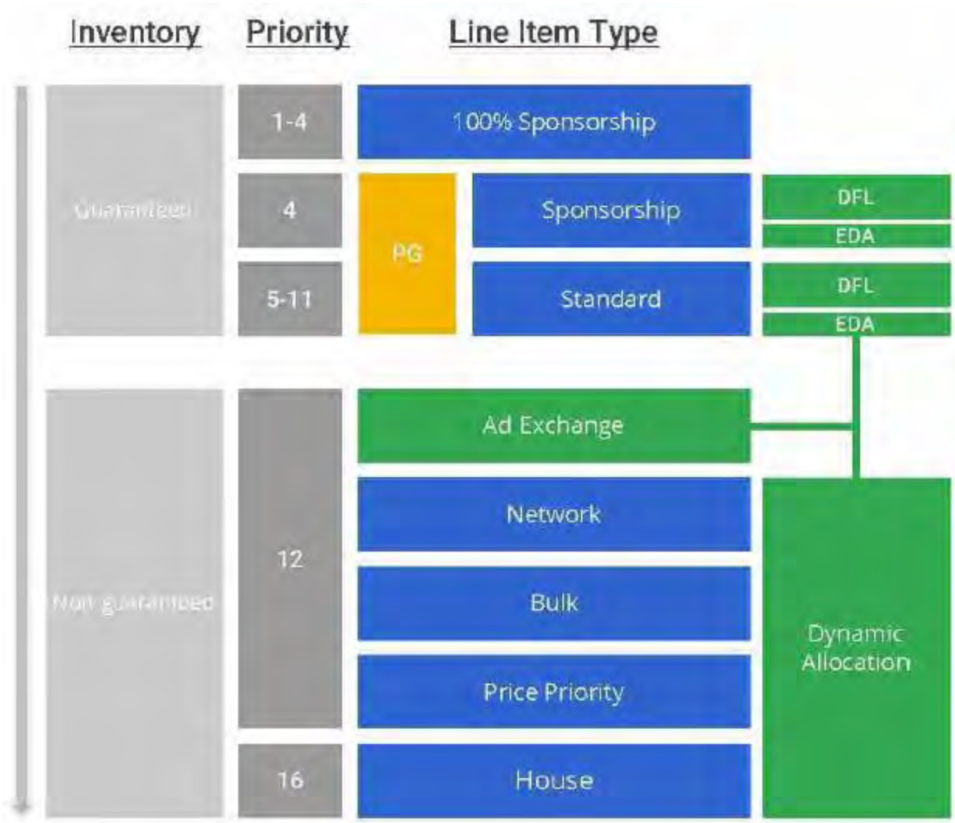
[134] GOOG-DOJ-09498307, at -312 (12/10/2019).

[135] GOOG-DOJ-12799286, at -291 (12/09/2019). The presentation also states that standard line items are "used by a publisher for booking directly sold campaigns and often includes additional first party data targeting or a custom integration that is not available through RTB", and price priority "is used for non-guaranteed line items such as exchange partners, SSPs, or networks" which "require publishers to enter a booked CPM rate."

[136] GOOG-DOJ-09498307, at -312 (12/10/2019); GOOG-DOJ-12799286, at -291 (12/09/2019).

[137] Google, "Line item types and priorities," Google Ads Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/177279 ("Any third-party ad network or exchange that provides an appropriate ad tag can be represented by a non-guaranteed line item that competes based on a price that you enter into Ad Manager–for example, this is how header bidding can be configured.").

Figure 20. DFP line item types and priorities



Source: GOOG-DOJ-04429792, at -805 (08/28/2017).

Figure 21. Line item types and priorities in DFP

Line item category	Line item type	Priority	Description
Guaranteed	Sponsorship	4	Serve based upon a defined percentage of impressions and a start and end time. Use this line item type for directly sold campaigns when your buyer wants to "takeover" a page or site. Can also be used to evenly rotate line items regardless of impression volume.
	Standard	6, 8, 10	Serve based upon a defined impression goal and start and end time. Use this line item type for directly sold campaigns when your buyer wants a specific number of impressions to serve. Delivery pacing is adjusted to meet the defined goal.
Ad network and exchange Non-guaranteed	AdSense	12	Target line items to specific inventory available to AdSense buyers via a line item. The AdSense line item type must be enabled for your Ad Manager network to use this option. If you don't see this line item type when adding a line item, talk to your Ad Manager administrator. Google Ad Manager also allows you to activate ad units for AdSense competition. One or more AdSense accounts may be used for various segments of inventory.
	Ad Exchange	12	Target line items to specific inventory available to Authorized Buyers and the Open Auction. One or more Exchange accounts may be used for various segments of inventory.
Other non-guaranteed	Network	12	Serve based upon a defined percentage of impressions. Use this for your partner ad networks which don't have an impression goal.
	Bulk	12	Serve based upon a defined impression goal, but because the inventory for bulk line items isn't guaranteed, the impression goal functions more like an impression cap, limiting the number of impressions that can be delivered. Use this for partners who have ordered a maximum number of impressions but aren't concerned about delivery timelines or guarantees.
	Price priority	12	Serve primarily based on price, with optional daily or lifetime delivery caps. Use this line item type to fill your site's unsold inventory with the highest-paying line item available.
	House	16	House line items only serve when no remnant line items (Network, Bulk, Price Priority), Ad Exchange or Open Bidding demand are available to serve. That is, House line items are treated as if they have a $0 rate and do not compete on price via Dynamic Allocation. House line item CPM determines ranking of eligible House ads but do not need to meet any floor price set in unified pricing rules in order to be eligible to serve an ad, thereby effectively serving as a fall-back ad.

Source: Google, "Line items types and priorities," Google Ad Manager Help, accessed December 18, 2023, https://support.google.com/admanager/answer/177279.
Note: Lower priority numbers indicate a higher priority.

(119) Figure 22 from a Google presentation presents a visual depiction of how DFP's different line item types assist publishers with monetizing their display inventory, and "work together to provide the highest level of competition".[138,139]

[138] GOOG-DOJ-09498307, at -309 (12/10/2019).

[139] Figure 22 shows that although AdX falls after guaranteed and other non-guaranteed line items, Google's Dynamic Allocation and Enhanced Dynamic Allocation ("EDA") programs allowed AdX to compete with these higher-ranked

II.C.3. Google Display Network (GDN)

(122) Google's display ad network, also referred to as the Google Display Network (GDN), consists of over 2 million websites, videos, and apps where targeted display ads can appear.[143] GDN consists of an advertiser-facing component, known as Google Ads, and a publisher-facing component, known as AdSense.

II.C.3.a. Google Ads

(123) Google Ads is Google's advertiser ad network.[144] With respect to display advertising, Google defines Google Ads as its "advertiser-facing component of Google's ad network, which advertisers can use to set up media campaigns to show digital ads on Google-owned inventory and third-party partner websites."[145] Using Google Ads, advertisers can control their ad settings and choose specific formats that they wish to run (e.g., text or image).[146] As they run ads, advertisers can also track campaign data related to conversions,[147] click-through rate ("CTR"),[148] keywords, search terms,[149] impressions, clicks, and average CPC.[150]

(124) One important feature of Google Ads as an advertiser ad network is the ability for bidders to bid for display ads on a CPC basis, even for impressions that are sold on a CPM basis. See Section II.B.2.b and Section IV.E.

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[143] Google, "Display Network: Definition," Google Ads Help, accessed December 18, 2023, https://support.google.com/google-ads/answer/117120. Note that "GDN" is used in internal documents and depositions to refer to both Google Ads and Google's sell-side inventory (e.g., AdSense publishers).

[144] Google, "Google Ads," accessed December 18, 2023, https://ads.google.com/home/. Originally launched in 2000 as Google AdWords, Google Ads originally allowed businesses to buy advertisements on Google search engine results pages. *See* GOOG-AT-MDL-010636992, at -994 (10/02/2021). Today, Google Ads allows businesses to execute Search, Shopping, Display, Video, App, and Local Campaigns, thus reaching audiences through Search, across websites, within Gmail, on YouTube, and more. *See* Dennis Buckley, "Types of Google Ads: Ad Formats, Campaign Types & Best Practices for 2022," Demand Curve, accessed December 18, 2023, https://www.demandcurve.com/blog/types-of-google-ads; Google, "Chose the right campaign type," Google Ads Help, accessed December 18, 2023, https://support.google.com/google-ads/answer/2567043. In this report, when I use Google Ads, I am referring to its display advertising component.

[145] GOOG-AT-MDL-006218257, at -260 (12/16/2022). Google also states that, "Google Ads is the advertising-facing component of Google's ad network, not a DSP." *See also* GOOG-AT-MDL-010636992, at -994 (10/02/2021).

[146] Google, "About Ad Formats available in different campaign types," Google Ads Help, accessed December 18, 2023, https://support.google.com/google-ads/answer/1722124?hl=en&ref_topic=3121941.

[147] Google, "About return on investment (ROI)," Google Ads Help, accessed December 18, 2023, https://support.google.com/google-ads/answer/1722066?hl=en&ref_topic=3121936.

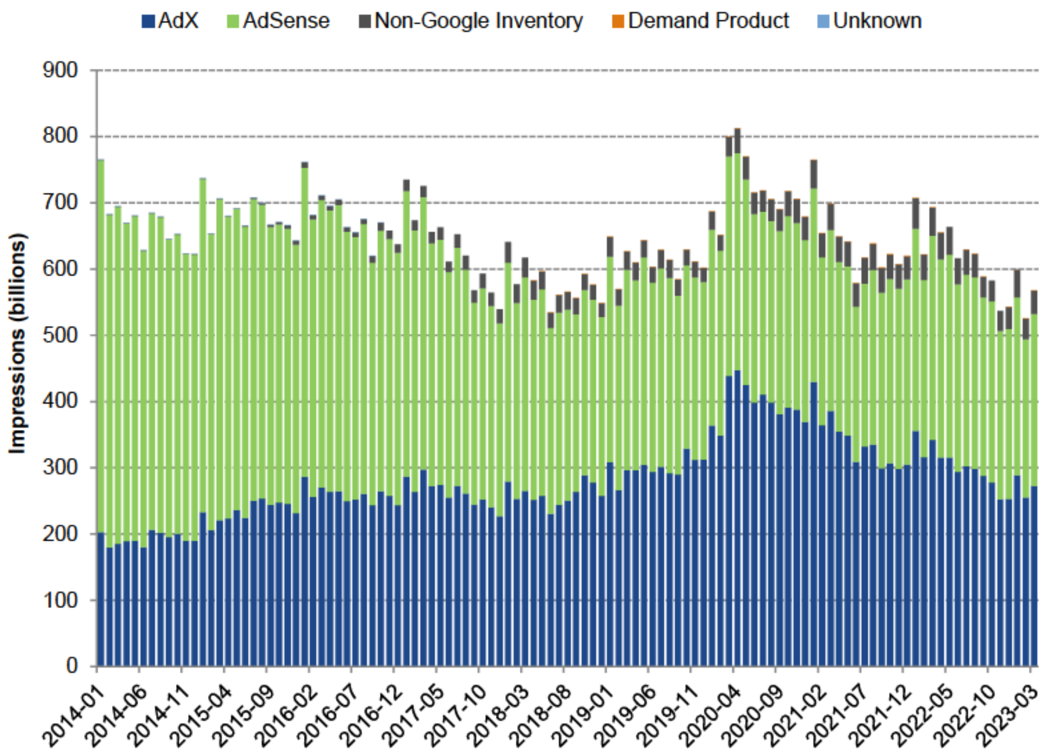
[148] "CTR is the number of clicks that your ad receives divided by the number of times your ad is shown." Google Ads Help, accessed December 18, 2023, https://support.google.com/google-ads/search?q=ctr.

[149] Google, "Measure traffic to your website," Google Ads Help, accessed December 18, 2023, https://support.google.com/google-ads/answer/1722035?hl=en&ref_topic=3121936.

[150] Google, "Use data to optimize your search campaigns," Google Ads Help, accessed December 18, 2023, https://support.google.com/google-ads/answer/9451527?hl=en&ref_topic=3121936.

(125) Google Ads, with some limited exceptions (see Section VII.B.3), restricts its purchase of publisher display inventory to AdX and the publisher-facing component of its ad network, AdSense (which I describe next). As shown in Figure 23, between January 2014 and March 2023, Google Ads purchased 97% of its display ad impressions though AdX or AdSense.

Figure 23. Inventory source for Google Ads, worldwide (Jan 2014–Mar 2023)



Source: Google Ads data (DOJ RFP 54).
Notes: Limited to worldwide open-web display impressions purchased through indirect transactions. Excludes impressions on Google properties. Demand Product is defined in Appendix K.3.

II.C.3.b. AdSense

(126) AdSense is the web publisher-facing component of Google's display ad network,[151] launched in June 2003.[152] AdSense provides open-web publishers with the option to sell display advertising to

[151] Google, "Compare Ad Manager, AdSense, and AdMob," Google AdSense Help, accessed December 18, 2023, https://support.google.com/adsense/answer/9234653?hl=en&ref_topic=1319753. Google distinguishes between AdSense for Content ("AFC") and AdSense for Search ("AFS"). AFC is "a self-service platform for Web publishers that do not have direct sales to monetize their content. AFC focuses on automation and offers limited controls to publishers." GOOG-DOJ-04004392, at -393 (09/10/2018). AFS allows publishers to monetize search results by serving ads within the publisher's own search features. When I refer to AdSense, I focus on AdSense for content as the relevant display product for this report. *See* Google, "Adsense for Search (AFS)," Google AdSense Help, accessed December 18, 2023, https://support.google.com/adsense/answer/9879?hl=en.

[152] GOOG-AT-MDL-006217592, at -608 (10/31/2022).

II.D. Fees for ad tech products

(138) In this section I describe the fee structures charged for publisher ad servers, exchanges, and bidding tools including ad networks and DSPs. **Publisher ad servers** including Google's DFP charge publishers a fixed amount per transaction served for certain transaction types.[178] For example, in the United States, DFP Premium charges [redacted] per 1,000 impressions served for a publishers' first 50 million direct impressions served in a month, decreasing to [redacted] above 6 billion impressions; DFP Small Business publishers are charged for impressions starting above a threshold of 90 million impressions in a month.[179] For DFP customers and some DFP premium customers, the ad serving fee is waived if Google is paid a revenue share through AdX or AdSense.[180] Certain publishers may negotiate DFP prices.[181]

(139) **Ad exchanges** typically charge a per-transaction fee. This transaction fee is referred to as a "take rate" or "rev share," which is deducted from payment from the advertiser that is received by the exchange before being passed along to the publisher. For example, if an exchange charges a 20% take rate, it means that if the winning advertiser paid the exchange 10 cents for one thousand impressions, the exchange keeps 2 cents of that 10 cents and passes along the remaining 8 cents to the publisher (or its ad server). According to Google, for inventory sold through open and private auctions in AdX, Google collects an average revenue share of 20% (equivalently, pays out an average revenue share of

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178 [redacted]

179 Google Responses to DOJ Ad-Tech Data Follow-Up Questions (July 10, 2020); Google Responses to DOJ Ad-Tech Data Follow-Up Questions, Appendix A, "Appendix A – Corrected sell-side rate card – HIGHLY CONFIDENTIAL.xlsx," (July 10, 2020).

DFP's ad serving fees are determined on a tiered basis based on the total impressions served by a publisher, transaction type, which version of DFP is being used, and other factors. In addition to the fixed per-transaction fee collected, Google may charge publishers a "General Setup Fee" over two years to use DFP Premium. In some cases, DFP contracts include terms on minimum monthly fees. These fees are either zero or the greater of a nominal fee and 50% of the publisher's average revenue in the prior six months. *See, e.g.*, DM_GOOG_0014757, at -761 (03/30/2023) ("MINIMUM TRADITIONAL AD SERVING SERVICE FEE: £0.00 per month"); GOOG-AT-MDL-002150558, at -561, (08/04/2021) ("MINIMUM TRADITIONAL AD SERVING SERVICE FEE:US $ 0.00 per month"); NEXSTAR001884, at -886 (11/11/2021) ("If Company has a pre-existing Google Ad Manager Network as of the Effective Date: the Minimum Traditional Ad Serving Service Fee per month will be the greater of $3,500 or 50% of the Expected Monthly Service Fee for Traditional Ad Serving." In this case the minimum fee is calculated as $25,500 per month.).

180 "Google Responses to DOJ Ad-Tech Data Follow-Up Questions (July 10, 2020)," at 1 ("For both Google Ad Manager and certain Google Ad Manager 360 customers, the ad serving fee is generally waived for impressions for which Google is also being paid a revenue share through Ad Manager's ad exchange or AdSense.")

181 *See also* "Google Responses to DOJ Ad-Tech Data Follow-Up Questions (July 10, 2020)," at 1 ("Individual customer agreements (particularly for Google Ad Manager 360) may contain negotiated pricing or additional ad serving fee waivers (e.g. for Open Bidding or mediated impressions), although the general structure is typically as described above.") *See*, e.g., GOOG-DOJ-06525488, at -488 (01/29/2018) ("DFP Core Discounts [redacted]) remain the same as previous deal and allow us to maintain large DFP volume. DFP Video discounts [redacted] open large video opportunity on DFP as Pandora ramps on this format.")

80%).[182, 183] [redacted].[184]

(140) **Advertiser ad networks** including Google Ads can charge advertisers a per-action fee, such as on a CPC basis, rather than a per-transaction fee.[185] That is, advertisers only pay when a user clicks on their ad, or takes some other action like viewing the ad. When Google Ads bids into exchanges that use a CPM pricing structure, Google Ads bids using a CPC-to-CPM conversion factor, which allows advertisers to pay on a CPC basis and publishers to sell on a CPM basis.[186] Given this, Google often describes Google Ads as "targeting" a take rate or "margin," which is computed based on the average of fees collected from advertisers and what is paid out to publishers across a set of impressions.[187] In my report, when I say Google Ads *targets a margin*, I mean it in this way. When placing bids on AdX, Google Ads targets a 15% margin. For transactions through Google Ads and AdSense, Google charges a combined 32% revenue share.[188]

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182 GOOG-AT-MDL-006217592, at -289 (Google's December 12, 2022 response to the European Commission reads, "Google's standard revenue share rate for Open Auction and Private Auction transactions is 20%, and Google's standard rate for Preferred Deal and Programmatic Guaranteed is 10%.") *See also* GOOG-DOJ-04429792, at -804 (2017 Google Presentation Displaying "Rev share: 80-20%" under "Open Auction" and "Private Auctions" headings). *See* Appendix J, which provides "waffle" charts from Google presentations depicting AdX fees through different buying channels.

183 Prior to 2019, Google used a policy called Dynamic Revenue Share to vary the revenue share percentage across transactions, while maintaining a certain average revenue share. Jonathan Bellack, a product manager at Google, testified that during his tenure Google introduced dynamic revenue share, in which publishers could allow Google to "raise or lower that revenue share on individual impressions when we believed we could make the publisher more money as long as it averaged out to the same amount at the end of the month." Deposition of Jonathan Bellack (Google), October 2, 2020, 256:13–256:24. *See also* GOOG-AT-MDL-006217592, at -593 (12/12/2023) and discussion in Section VII.D.1.b.

184 [redacted]

185 For example, Google Ads typically charges on a cost per action basis. GOOG-AT-MDL-006217592, at -610 (12/12/2022) (Google's December 12, 2022 response to the European Commission) ("When advertisers use Google Ads to buy display ads, Google Ads does not typically charge advertisers a per transaction fee, or a fixed revenue share. Instead, advertisers are typically charged when a user takes an action, such as clicking on an ad (referred to as a cost-per-click (CPC) basis.").

186 GOOG-AT-MDL-006217592, at -609–610 (12/12/2022).

187 GOOG-AT-MDL-006218257, at -264 (12/16/2022) ("Google Ads targets an around 15% aggregate take rate when placing bids on AdX. When bidding on third-party SSPs via AWBid, Google Ads targets a 32% aggregate take rate for remarketing and a 50% aggregate take rate for non-remarketing targeting types.") *See also* GOOG-AT-MDL-006218271, at -289 (01/06/2023) ("As explained in the response to Question 35 of RFI 7, when Google Ads bids on an SSP, Google retains a varying take rate that is calculated as the difference between the payments received from advertisers and the amount it paid to the SSP.") *See also* Deposition of Todd Parsons (Criteo), September 8, 2023, 172:7–172:11 ("Q Yeah. So Criteo earns revenue in this context by purchasing an impression on a CPM basis and then reselling it on a CPC basis. A That's correct."). *See also* CRITEO_GOOGLELIT_0000000729, at -730 (05/17/2023) (Criteo targets a [redacted] rate for new customers and a [redacted] rate for current customers in the US); A 2019 email describes net revenue to be the "% buyside fee" for Google Ads (GOOG-AT-MDL-003566654, at -655 (07/16/2019).

188 GOOG-AT-MDL-006218257, at -264 (12/12/2022), GOOG-AT-MDL-000969513, at -525 (11/2020); Google, "AdSense revenue share," Google AdSense Help, accessed December 18, 2023, https://support.google.com/adsense/answer/180195.

(141) **DSPs** often charge fees based on a revenue share. For example, while Google's DV360 DSP does not explicitly charge a per-transaction fee, advertisers who use the service are charged a monthly service fee which is calculated as the sum of a tiered percentage of their "exchange" spend and a flat percentage of their "non-exchange" spend in a given month.[189] Some DSPs may also incorporate a tiering system whereby the aggregate per-transaction fee shifts based on the total volume of transactions an advertiser purchases.[190]

(142) As there are multiple ad tech products that may be involved in the sale of a particular display ad impression, the overall cost incurred by publishers and advertisers for the sale of a display ad is the sum of the fees incurred across all products used in the transaction. Figure 25 from a 2014 Google presentation illustrates how a hypothetical expenditure of $100 is divided among the various layers of the ad tech stack as it passes from the buy-side to the sell-side and ultimately to publishers.[191]

(143) For ad exchanges and bidding tools, Google documents often use the term "net revenues" to refer to the difference between the payments received minus what is paid out, thereby representing fees and revenue share collected by the product.[192]

[189] Advertisers' "exchange" spend on DV360 includes purchases through Open or Private Auction. The tiered percentage "depends on the customer's total exchange spend and generally ranges from 11% to 15% for customers using the self-service option and 17 to 27% for the small number of customers using the managed service option." *See* GOOG-AT-MDL-006217592, at -610 (12/12/2023).

[190] "DSPs offering [a share of media cost-based pricing model] will usually do so on a sliding scale or tiered system based on volume; for example, you might pay 15% of all media purchased before hitting $250k and 14% for spend between $250k and $500k". *See* IPONWEB, "The Price is Right: Which Programmatic Pricing Model Should You Choose?," IPONWEB, June 30, 2021, https://www.iponweb.com/the-price-is-right-which-programmatic-pricing-model-should-you-choose/.

[191] Figure 25 is taken from a 2015 document (GOOG-DOJ-03641972, at -981 (12/10/2015)). However, the components of the stack depicted in the figure remain essentially the same at present even though the products have evolved. The amount taken from the stack at present appears to be slightly lower than the amount shown in Figure 25. For example, Google publicly acknowledged that its take from advertiser spend flowing through Google Ads/DV360 and GAM in 2019 was approximately 31%. *See* *See* Sissie Hsiao, "How our display buying platforms share revenue with publishers," Google Ad Manager, June 23, 2020, https://blog.google/products/admanager/display-buying-share-revenue-publishers/.

[192] A 2019 Google presentation defines net revenue to be "booked revenue" (media spend plus buy-side fees, minus adjustments) minus the revenue share (also referred to as TAC or traffic acquisition cost) paid to the publisher (GOOG-AT-MDL-003567004, at -006 (05/2019)). A 2019 email describes net revenue to be the "gross revenue" minus TAC and buyside fees for sellside products (GOOG-AT-MDL-003566654, at -655 (07/09/2019)).

numerous ways.[256] Some responses involved introducing new products and features (e.g., Google's Exchange Bidding product), consistent with competitive pressures benefiting customers. Other responses—including those that removed product features, eliminated rivals, or otherwise impeded their ability to attract advertisers and publishers—likely harmed customers and competition.

III.D. The importance of scale for the competitiveness of ad tech products

(194) The competitiveness of a product is affected by both its attractiveness to customers and its costs of production. Within economics, it is well known that a product's *scale* across a variety of measures can affect both of these dimensions of competitiveness. For example,

- If a product is more attractive to each user as the total number of users grows, a product exhibits positive network effects.[257]
- If the average cost of producing a product falls as more of the product is supplied, there are economies of scale.[258]
- If doubling the inputs used to make a product more than doubles the amount of output, there are increasing returns to scale.[259]

(195) These concepts—network effects, economies of scale, and returns to scale—are widely referenced and have been extensively studied empirically in the academic literature across a diverse range of industries.[260]

256 *See, e.g.,* GOOG-TEX-00138857, at -857 (02/09/2017) (2017 DRX All Hands – Competitive Session presentation reads, "Competition is one of the forces that drive us to provide our partners the products that best meets their needs. As we look forward, there are many reasons why we see competition in the market getting fiercer…We recognize that nearly all exchanges have a mechanism to engage in per impression pricing via Header Bidding.").

257 *See* Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization* (Boston: Pearson/Addison Wesley, 2005), 392–93; Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics*, 7th ed. (Upper Saddle River: Pearson Prentice Hall, 2009), 136–140 and 515–516 (explaining why Internet auctions are subject to very strong positive network effects); Hal R. Varian, *Intermediate Microeconomics*, 9th ed. (New York: W.W. Norton & Company, 2014), 697–699.

258 *See* B. Douglas Bernheim and Michael D. Whinston, *Microeconomics*, 2nd ed. (New York: McGraw-Hill Education, 2014), 271–273; Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics*, 7th ed. (Upper Saddle River: Pearson Prentice Hall, 2009), 245–247; Hal R. Varian, *Intermediate Microeconomics*, 9th ed. (New York: W.W. Norton & Company, 2014), 387–388.

259 *See* B. Douglas Bernheim and Michael D. Whinston, *Microeconomics*, 2nd ed. (New York: McGraw-Hill Education, 2014), 228–231; Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics*, 7th ed. (Upper Saddle River: Pearson Prentice Hall, 2009), 215–218; Hal R. Varian, *Intermediate Microeconomics*, 9th ed. (New York: W.W. Norton & Company, 2014), 358–361.

260 *See*, *e.g.*, Susanto Basu and John G. Fernald, "Returns to Scale in U.S. Production: Estimates and Implications," *Journal of Political Economy* 105, no. 2 (1997), 249–283; Jan De Loekcer and Chad Syverson, "An industrial organization perspective on productivity," *Handbook of Industrial Organization*, Volume 4, eds. Kate Ho, Ali Hortaçsu, and Alessandro Lizzeri (2021), 141–223; Dimitrije Ruzic and Sui-Jade Ho, "Returns to Scale, Productivity, Measurement,

(196) As used in this report for the purposes of discussing ad tech products, I use *scale* to refer to two measures. The first is related to the *adoption* of an ad tech product by customers, as measured by the number of advertisers and publishers using a product. The second is related to the *usage* of an ad tech product, as measured by the volume of impressions that a network, exchange, or server "sees" (i.e., is able to bid upon or solicit bids for) or "wins" and is ultimately served by that product.

(197) In this Section, I describe why these measures of scale, measured by both adoption and usage, is important for the competitiveness of ad tech products that are the focus of this report in at least three ways:

1. Due to positive indirect network effects, greater adoption by publishers and advertisers improves the attractiveness of an ad tech product to each set of customers (Section III.D.1).
1. When there are significant fixed costs for an ad tech product, greater usage improves that product's scale economies—i.e., the extent to which fixed costs can be covered by margins earned across more impressions and sales (Section III.D.2).
2. Greater usage generates data, which is used to improve a product's attractiveness to advertisers and/or publishers (for example, by improving ad targeting or pricing algorithms) or its profitability for its owner, and facilitates experimentation which assists with innovation and product improvement (Section III.D.3).

(198) An ad tech product that is meaningfully impeded from acquiring scale would thus likely be at a significant competitive disadvantage relative to one that does not face such constraints. This is because products that are denied scale would be less able to offer comparably attractive or low-priced products, and improve their product offerings through investment and experimentation.

(199) Although this discussion highlights the value of scale for improving an ad tech product's competitiveness, it is also important to bear in mind that scale wielded by a firm with substantial market power can be used for anticompetitive ends. Later in this report, I address how Google's scale is a source of its market power (Section V.A), and how Google used its market power to harm the

and Trends in US Manufacturing Misallocation," *Review of Economics and Statistics* 105, no. 5 (2023), 1287–1303; Joe S. Bain, "Economies of Scale, Concentration, and the Condition of Entry in Twenty Manufacturing Industries," *American Economic Review* 44, no. 1 (1954), 15–39; Hassan Y. Aly, Richard Grabowski, Carl Pasurka and Nanda Rangan, "Technical, Scale, and Allocative Efficiencies in US Banking: An Empirical Investigation," *Review of Economics and Statistics* 72, no. 2 (1990), 211–218; Christopher C. Klein and Reuben Kyle, "Technological Change and the Production of Ocean Shipping Services," *Review of Industrial Organization* 12, no. 5/6 (1997), 733–750; Neil Gandal, "Hedonic Price Indexes for Spreadsheets and An Empirical Test for Network Externalities," *RAND Journal of Economics* 25, no. 1 (1994), 160–170 ; Garth Saloner and Andrea Shepard, "Adoption of Technologies with Network Effects: An Empirical Examination of the Adoption of Teller Machines," *RAND Journal of Economics* 26, no. 3 (1995), 479–501; Bruno Jullien, Alessandro Pavan, and Marc Rysman, "Two-sided Markets, Pricing, and Network Effects," *Handbook of Industrial Organization*, Volume 4, eds. Kate Ho, Ali Hortaçsu, and Alessandro Lizzeri (2021), 485–592.

competitiveness of rivals—in part, by denying them scale that would have enabled them to improve the attractiveness of their products (Section VII.F).

III.D.1. Greater advertiser and publisher usage generates positive indirect network effects

(200) Greater scale of an ad tech product—as measured by its adoption by advertisers and publishers—is important because of indirect network effects. All else equal, a product with greater advertiser adoption is more attractive to publishers, and a product with greater adoption by publishers is more attractive to advertisers.

(201) For example, as discussed earlier, an advertiser likely derives greater value from bidding into a particular ad exchange if there are more publishers using—and hence, more impressions available on—that exchange.[261] Access to more publishers and inventory provides an advertiser with greater opportunity to target and reach both a wider audience and particular sets of consumers.[262]

(202) Similarly, a publisher likely derives greater value from selling impressions through an ad exchange if there are more advertisers bidding through that exchange as well. This follows from the economic result that having more bidders in an auction tends to increase competition and the payment made to the seller.[263] Consistent with this, documents and testimony indicate that AdX's unique access to advertiser demand from Google Ads increases the attractiveness of AdX to publishers.[264] Additionally

261 *See*, e.g., GOOG-DOJ-04004392, at -395 (A 2018 Google document on guiding principles and approaches for publisher strategy states that one of the "primary goal[s] of the Sellside Business" is to "bring access to quality inventory for the Display buyside." The document states that "having a sellside presence provides a significant chunk of additional reach which is very valuable to our advertisers.").

262 *See, e.g.*, Deposition of Benneaser John (Microsoft), September 8, 2023, 229:11–230:9 ("Q.…How, if at all, does scale affect whether it's easy or difficult for a company to enter the ad tech business? A. So when it comes to scale, let's use the example of user. On the buy side, let's say an advertiser wants to advertiser their product across the age group of 40 and 50 or across a specific region. They won't be able to reach through only one publisher or through only one farmer; so they are looking for multiple publishers where the user swings or goes or navigates multiple properties. So that's the – that is the scale of reach advertisers need. […] And on the publisher side they don't have the scale that they'll be able to meet the needs of advertisers, so they're looking for diversity of demand that they'll be able to attract, and how will they participate into that market or network where they don't have all the skills an advertiser is looking for.").

263 Hal R. Varian, *Intermediate Microeconomics*, 9th ed. (New York: W.W. Norton & Company, 2014), 342 ("The general principle is that the expected revenue will keep increasing as the number of bidders increases, but it will do so at a slower rate."). *See also* Jeremy Bulow and Paul Klemperer, "Auctions Versus Negotiations," *American Economic Review* 86, no. 1 (1996); Lance Brannman, J. Douglass Klein, and Leonard W. Weiss, "The Price Effects of Increased Competition in Auction Markets," *Review of Economics & Statistics* 69, no. 1 (1987): 31 ("In this paper we have examined the theoretical and empirical relationships between price and the number of bidders in a variety of auction markets. An obvious and important result is the very significant positive effect of the number of bidders on buying price…regardless of the specific index used.").

264 For example, in a 2016 email, Google executive Jerome Grateau states that one of DFP/AdX's 3 core differentiators is "[e]xclusive access to GDN demand justifying a 20% rev share and strict Sell Side policy." GOOG-DOJ-14516983, at -983 (01/12/2016). *See also* GOOG-TEX-00119815, at -816 (09/04/2016) (In a 2016 internal email chain, Jonathan Bellack writes "DFP's attractive inventory footprint is *the* reason buyers focus on AdX, even though we are harder to do business with than other exchanges."); GOOG-DOJ-04004392, at -397 (08/2018) (A 2018 internal Google memo on Google's publisher strategy noted: "[r]ecent market dynamics (header bidding, Amazon TAM offering, free mediation in apps) are putting pressure on the 20% [AdX] fee and it is becoming more clear that the market bears the fee primarily

a 2014 Google simulation described results if Google Ads' did not participate in AdX auctions: more than half of the impressions that publishers offered on its ad exchange would go unsold and publisher payouts would fall dramatically.[265] If there are fewer advertisers bidding into an ad exchange (via advertiser ad networks and DSPs), then all else equal, the expected monetization for a publisher from that exchange would be lower. (I discuss the exclusive bidding relationship between Google Ads and AdX in more detail in Section VII.B.)

(203) Having more customers using an ad tech product, thus, tends to make that product more attractive to other types of customers through indirect network effects. This increases adoption and, in turn, further increases the value of the product. This phenomenon is referred to as a positive feedback loop.[266]

(204) As another example of this phenomenon, if an advertiser ad network can bid on a greater amount of open-web display inventory from publishers, the ad network becomes more attractive to advertisers as a bidding tool to use for their campaigns. If more advertisers use the ad network and allocate a greater budget to be spent on it, the network's yield and monetization performance for publishers likely increases. This increase can arise from greater competition among advertisers, as well as from better "matches" between advertisers and publishers' impressions (generated by the users visiting publishers' websites).[267] Greater performance of the network then attracts even more publishers, which then attracts more advertisers, and so on.

because of exclusive access to our AdWords demand."); Deposition of Bryan Rowley (Google), July 27, 2021, 108:18–109:3 ("When [advertiser] demand can only be found through certain sources, it compels publishers to work with that product.").

265 GOOG-DOJ-15140608, at -608 (01/2014) (Impact of GDN not participating in AdX Auctions in January 2014 was that "AdX buyers now win some of these queries, but a large number (70%) go unmatched (which is interesting)") and -609 ("Daily Publisher Payout" is approximately $2.6 million with GDN bids and approximately $256,000 without GDN bids).

266 *See*, *e.g.*, Carl Shapiro and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Boston: Harvard Business School Press, 1999), 224 (The "main lessons to take away from the economics of networks and positive feedback" include that "[p]ositive feedback is the dynamic process by which the strong get stronger. But there is a dark side to the force: positive feedback also makes the weak get weaker" and "[p]ositive feedback works to the advantage of large networks and against small networks.") (emphases suppressed).

267 *See*, *e.g.,* Zikun Ye, Dennis J. Zhang, Heng Zhang, Renyu Zhang, Xin Chen, and Zhiwei Xu, "Cold Start to Improve Market Thickness on Online Advertising Platforms: Data-Driven Algorithms and Field Experiments," *Management Science* 69, no. 7 (2023), 3839 ("If the number of ad impressions remains the same, a thicker market implies a higher revenue for the platform, with a decreasing marginal return. This is because, with higher market thickness, on one hand, some user impressions that would otherwise be left unmatched can be matched with suitable ads and, on the other hand, the ads have more intensive competitions in the auctions on the platform."). More generally, in other settings, *see also* David S. Evans, "The Antitrust Economics of Multi-Sided Platform Markets," *Yale Journal on Regulation* 20, no. 2 (2003), 332 ("Generally, in matchmaking markets customers of each type benefit from being able to search a larger group of customers of the other type for a suitable match") and 334 ("Each member of a group values the service more highly if there are more members of the other group, thereby increasing the likelihood of a match and reducing the time it takes to find an acceptable match"); David S. Evans and Richard Schmalensee, "The Antitrust Analysis of Multisided Platform Businesses," *Oxford Handbook of International Antitrust Economics*, Volume 1, eds. Roger D. Blair and D. Daniel Sokol (2015), 410 ("A usage externality exists when two economic agents need to act together, to use the platform, to create value…OpenTable and similar businesses help generate these usage externalities by making it easier for restaurants and diners to enter into this transaction. They also increase the value of usage externalities by increasing the quality of the matches: they make it easier for people to find the best restaurant for the particular occasion

(205) Indeed, Google documents and testimony has acknowledged the importance of network effects for its ad tech products.[268]

(206) Industry participants also corroborate the importance for ad tech products of advertiser demand to publishers,[269] and inventory supply to advertisers.[270] For example, OpenX CEO John Gentry described these relationships as "a positive cycle" and noted that "scale begets scale":

> I would characterize network effects as basically scale begets scale, and you kind of create a positive cycle around something. So in the display business I would say that network effects are very much in effect, which is once you acquire a significant amount of publisher scale, then you have an opportunity to acquire a significant amount of demand scale. As you have more demand scale, you become more attractive to publishers so that you can improve your penetration of publishers. And that's kind of the cycle and how it works.[271]

(207) That network effects tend to be persistent is also well-documented in the economics literature.[272] In particular, it may be difficult for customers to coordinate on which product to use, and hence any

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involved.").

[268] For Google Ads, *see, e.g.*, GOOG-DOJ-29478169, at -172 (07/2014) (A 2014 GDN Inventory Strategy deck states, "Network effects are strong: Adding a publisher to the network adds a lot of value for advertisers (reach)" and "Adding an advertiser to the network adds a lot of value for pubs (auction pressure)").
For AdX, *see, e.g.*, GOOG-DOJ-04445011, at -014 (05/2013) (A 2013 Google deck identifies that "[W]ithout AdX, wouldn't have the network effect…More pubs from DFP means more attractive to advertisers… more advertisers means more desire for pubs to get on DFP… virtuous circle."); Deposition of Eisar Lipkovitz (Google), March 31, 2021, 239:5–239:17 (Eisar Lipkovitz, VP of Engineering for Google's Display & Video division from 2016–2018, testified that SSPs compete for access to inventory, and "if you find a way to make it more attractive to buyers … you will then use that to go to tell sellers, you should sell here, because I have more buyers. And then you're going to go back to buyers and say, I just got more sellers, you shouldn't buy anywhere else. So you get the dynamic that … more parties, doesn't matter if it's buyers and sellers, have this virtual cycle that … makes the whole thing sort of more competitive."). For DFP, see Section VII.A.

[269] *See, e.g.,* Deposition of Michael Shaugnessy (Kargo), August 9, 2023, 43:24–44:10 and 50:9–25 (Access to AdX's demand through DFP is "a significant consideration for publishers" and that ("[p]ublishers use Google Ad Manager and would not switch, as far as I know, unless there was an opportunity to access this type of demand"). *See also* Deposition of Brian O'Kelley (AppNexus), September 29, 2023, 93:23–:95:18 ("With Google having a unique demand source, switching away from AdX or switching away from DFP would mean losing one of the largest demand sources, if not the largest demand source, and, therefore, would have significant monetization implications, or cost you a lot of money, or could, if you left.").

[270] *See, e.g.,* FBDOJ003260796, at -796 and -798 (02/2018) (Facebook emphasized the importance of scale as measured by the supply of publisher inventory in its Facebook Audience Network product, noting "[i]n order for [Audience Network] to be successful we need to deliver Advertiser Value AND Scale" (emphasis removed) and "the more supply the better for Advertiser Value".). *See also* Deposition of Benneaser John (Microsoft), September 8, 2023, 213:20–214:16 ("So it's like you need to have a dynamic nature of advertising dollars, and you need to have a dynamic nature, a diverse nature of the inventory of publishers as well; and when you bring them, it brings the network effect that grows.").

[271] Deposition of John Gentry (OpenX), October 26, 2023, 54:4–54:21.

[272] *See*, e.g., Hal R. Varian, "Competition and Market Power," *The Economics of Information Technology: An Introduction* (Cambridge: Cambridge University Press, 2004), 36–37 ("Network effects are clearly prominent in some high-technology industries. . . . Once a firm has established market dominance with a particular product, it can be extremely hard to unseat it."); Bruno Jullien, Alessandro Pavan, and Marc Rysman, "Two-sided Markets, Pricing, and Network Effects," in *Handbook of Industrial Organization*, Volume 4, eds. Kate Ho, Ali Hortaçsu, and Alessandro Lizzeri

product that manages to attract enough customers may find itself keeping those customers and continuing to attract more.[273] Moreover, this persistence can be exacerbated if there are meaningful switching or multihoming costs. Such costs reduce the likelihood that customers, after adopting a product, will use a rival; hence, any network effects generated by those customers will tend to stay with their initial product. For these reasons, network effects generated by a product's customers can be a source of market power and create barriers to entry.[274]

(208) In Section V, I discuss network effects further when examining Google's market power and barriers to entry for advertiser ad network, exchange, and publisher ad server products.

III.D.2. Greater usage improves scale economies for an ad tech product

(209) Greater scale—as measured by the volume of transactions that are won and served—enables an ad tech product to operate more cost efficiently.[275] This is because fixed costs are significant for many ad tech products.[276] As a result, ad tech products likely exhibit traditional "economies of scale": if an ad

(2021), 488 ("As a product with network effects diffuses into the market, it becomes more valuable and drives further adoption. Indirect network effects thus lead to a feedback loop as more participants on each side of the platform find it more valuable to adopt and use the platform when they expect the other side to attract more users. This phenomenon leads to efficiencies as more market participants are able to interact with each other but also, in some circumstances, market power, as network effects can protect platform owners from entry. In markets with low marginal costs, as is the case for many digital markets, platforms with strong network effects can grow to be enormous and eventually dominate the market."); Joseph Farrell and Garth Saloner, "Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation," *American Economic Review* 76, no. 5 (1986), 940–955.

273 *See, e.g.,* Joseph Farrell and Garth Saloner, "Standardization, compatibility, and innovation," *RAND Journal of Economics* 16, no. 1 (1985), 70-83.

274 *See, e.g.,* Preston McAfee, *Competitive Solutions: The Strategist's Toolkit* (Princeton: Princeton University Press, 2002), 75–76 ("Ownership of a network good can be incredibly valuable, because entry against an established incumbent is so difficult … entrants must enter at a massive scale to challenge the value created by the incumbent's large network…[which] create[s] an entry barrier, and this barrier permits sustainable profits for the incumbent."); Joseph Farrell and Paul Klemperer, "Coordination and Lock-in: Competition with Switching Costs and Network Effects," in *Handbook of Industrial Organization*, Volume 3, eds. Mark Armstrong and Robert H. Porter (2007), 1967–2072 and 1999–2000 ("While the fat-cat effect gives new entrants an advantage in competing for new customers, it is very hard for them to compete for customers who are already attached to an incumbent. There is also adverse selection: consumers who switch are likely to be less loyal, hence less valuable, ones. So entry may be hard if small-scale entry is impractical, due perhaps to economies of scale, or to network effects. Furthermore, even new consumers may be wary of buying from a new supplier if they know that it can only survive at a large scale, since with switching costs consumers care about the future prospects of the firms they deal with."). *See also* Emilio Calvano and Michele Polo, "Market Power, Competition and Innovation in Digital Markets: A Survey," *Information Economics and Policy* 54 (2021), 1–18.

275 For AdX and Google Ads, Google allocates machine costs according to number of impressions served. *See* Deposition of Jessica Mok (Google), November 10, 2023, 53:2–16. ("Q. And what about the products within DVAA? A. The allocation of costs -- machine costs to product P&Ls within DVAA, we -- the methodology has evolved over time. Currently, we use -- currently, I think we use impressions. Q. And at the product level, so say for AdSense, are machine costs allocated according to the number of impressions? A. I believe so. Q. And what about for AdX? A. Same. […] Q. What about Google Ads? A. Share of impressions, yes."). *See also* Deposition of Andrew Casale (Index Exchange), September 26, 2023, at 238:7–238:22 ("Q. What do you consider to be the most relevant metric or metrics for measuring scale in programmatic open web display? ... A. I would say the total volume of auctions that you run, that's your ability to absorb the entirety of the scale of publishers, and then the total volume of auctions you clear which is really the most powerful signal that you give to any model, whether it be for price discovery, the win rate curves that I had mentioned or any form of curation.").

276 *See* Sections V.B.2.b, and V.C.2.b.

tech product serves more impressions, it is able to cover its fixed costs across a greater number of impressions and average costs are likely to be declining as more impressions are won and served.[277]

(210) Moreover, ad tech products typically only receive revenue when serving impressions but also incur costs when a product competes for (but does not necessarily win) an impression.[278] This implies that an ad tech product with a greater number of impressions served and a greater win rate (i.e., impressions bid upon that are won) would also be able to cover its costs with a lower per-transaction fee than a product with fewer impressions served, all else equal.

(211) In his report, Prof. Weintraub provides examples of "economically important costs" for ad tech products, which include costs incurred with running real-time auctions and with competing and bidding within real-time auctions.[279] These costs include engineering costs, infrastructure costs, and labor costs.[280] I rely on these opinions regarding materiality of costs to support my opinion on the presence of economies for scale.

III.D.3. Scale generates data that improves the attractiveness and profitability of ad tech products and facilitates experimentation

(212) Greater scale (as measured by usage of the product) allows an ad tech product to collect more data and improve the attractiveness of its products for its customers. This improved attractiveness takes the form of generating higher returns for advertisers and greater expected monetization for publishers. Additionally, the data that is generated from greater scale also can be used to improve the profitability for the firm offering the ad tech product.

(213) Some of the examples that I discuss in this section are based on methods that are studied and used in economics. For example, the economics literature has detailed how additional data can also be used to

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[277] B. Douglas Bernheim and Michael D. Whinston, ***Microeconomics***, 2nd ed. (New York: McGraw-Hill Irwin, 2014), 271 ("A firm experiences economies of scale when its average cost falls as it produces more. This occurs when cost rises less, proportionately, than the increase in output."). ***See also*** Hal R. Varian, ***Intermediate Microeconomics***, 9th ed. (New York: WW Norton, 2014), 360 ("it could happen that if we scale up both inputs by some factor ***t***, we get ***more*** than ***t*** times as much output. This is called the case of increasing returns to scale."); B. Douglas Bernheim and Michael D. Whinston, ***Microeconomics***, 2nd ed. (New York: McGraw-Hill Irwin, 2014), 272 ("When a firm's input prices do not vary with the amount it produces, it experiences economies of scale if it has an increasing returns to scale technology.").

[278] [redacted]

[279] Expert Report of Gabriel Weintraub, Ph.D., United States of America, et al., v. Google, LLC, Case No. 1:23-cv-00108, December 22, 2023 (hereinafter, "Weintraub Report"), Section III.D.

[280] Weintraub Report, Section III.D.

improve certain methods such as prediction, machine learning, and estimation.[281] Furthermore, Google's internal documents and research has acknowledged that these methods benefit from large amounts of data.[282]

(214) In reaching my opinions on the importance of scale and data for the competitiveness of ad tech products, I rely on the following conclusions expressed by Prof. Weintraub and Prof. Ravi regarding the importance of scale for generating data that improves ad tech product quality, and for experimentation:

- Prof. Weintraub opines that scale generates data, which enables the development and training of algorithms and improves the quality of ad tech products (on both the "buy side," representing bidding tools, and the "sell side," representing publisher ad servers and ad exchanges),[283] and scale assists companies with running informative experiments used to evaluate new product features.[284] In particular, Prof. Weintraub reaches the following opinions on these topics:
    - On the buy side, Prof. Weintraub opines that data at scale are used to determine the quality and value of impressions, to develop real-time bidding strategies, and to evaluate the intensity of competition for impressions.[285]
    - On the sell side, Prof. Weintraub opines that data at scale are used to improve algorithms for reserve price optimization, to detect fraud, to evaluate the best buyers for particular impressions (termed "curation"), and to dynamically adjust take rates.[286]

[281] *See*, *e.g.*, Hal R. Varian, "Big Data: New Tricks for Econometrics," *Journal of Economic Perspectives* 28, no. 2 (2014), 3 ("Conventional statistical and econometric techniques such as regression often work well, but there are issues unique to big datasets that may require different tools. First, the sheer size of the data involved may require more powerful data manipulation tools. Second, we may have more potential predictors than appropriate for estimation, so we need to do some kind of variable selection. Third, large datasets may allow for more flexible relationships than simple linear models. Machine learning technique such as decision trees, support vector machines, neural nets, deep learning, and so on may allow for more effective ways to model complex relationships."). *See also* Sendhil Mullainathan and Jann Spiess, "Machine Learning: An Applied Econometric Approach." *Journal of Economic Perspectives* 31, no. 2 (2017), 87–106; Alexandre Belloni, Victor Chernozhukov, and Christian Hansen, "High-Dimensional Methods and Inference on Structural and Treatment Effects," *Journal of Economic Perspectives* 28, no. 2 (2014), 29–50; and Emilio Calvano and Michele Polo, "Market Power, Competition, and Innovation in Digital Markets: A Survey," *Information Economics and Policy* 54 (2021), 14 ("Many digital firms' core business is that of making *predictions* of various sorts. … These predictions are made through statistical models (i.e. algorithms) fed by the vast amount of data that online businesses harness on their consumers.").

[282] For example, a 2020 Google presentation reads "Prediction/Bidding models don't learn well on small amount of experimental traffic." *See* GOOG-DOJ-13627314, at -354 (02/05/2020). *See also* H. Brendan McMahan *et al.*, "Ad Click Prediction: a View from the Trenches," Google Research, *available at* https://research.google/pubs/pub41159/, 1222 ("Sponsored search advertising, contextual advertising, display advertising, and real-time bidding auctions have all relied heavily on the ability of learned models to predict ad click-through rates accurately, quickly, and reliably") and 1227 ("[S]mall improvements can have meaningful impact at scale and need large amounts of data to be observed with high confidence.").

[283] Weintraub Report, Section III.B

[284] Weintraub Report, Section III.C

[285] Weintraub Report, Section III.B.2.

[286] Weintraub Report, Section III.B.2.

  - Prof. Weintraub also opines that data at scale are used by both buy side and sell side ad tech platforms to predict ad click-through rates, which are important for an ad tech products' ability to charge advertisers to pay on a cost-per-click basis and pay publishers on a CPM basis.[287]
  - With regard to experimentation, Prof. Weintraub opines that ad tech platforms with less scale may find it more difficult to detect the effects of an experiment in their data, or may find it more costly to run experiments while maintaining the same level of statistical power.[288]
- Prof. Ravi opines that "Transaction scale" (i.e., a higher rate of completed transactions) improves product quality by providing ad tech products with more data and inputs that provide (i) better information for pricing, (ii) better scheduling and targeting opportunities, and (iii) more data for experimentation.[289]

(215) Below, I discuss academic literature, Google documents, and testimony from third parties that corroborate these opinions.

(216) **Scale and data help improve the attractiveness of ad tech products.** There are several ways in which data improves the attractiveness of ad tech products.

(217) First, Google documents indicate that additional data increases an ad tech product's efficiency by improving the tracking and targeting of users, which results in better matches of impressions to advertisers (in turn, increasing their valuations and likely willingness to pay for those impressions).[290,291] This is corroborated by findings and discussion in the academic literature.[292]

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287 Weintraub Report, Section III.B.2.

288 Weintraub Report, Section III.C.

289 Expert Report of Ramamoorthi Ravi, Ph.D., United States of America, et al., v. Google, LLC, Case No. 1:23-cv-00108, December 22, 2023, Section IV.A.

290 Google defines efficiency in its documents as the total value of the auction, including the value to the advertiser, publisher, and Google. *See, e.g.,* GOOG-DOJ-AT-02218556, at -557 (05/2019) ("Efficiency is defined as how the buyer(s) value the query, but it's actually the total value of the auction. Suppose an advertiser values an impression at $3 CPM, and we charge them $1. Then because of that payment, they actually realize a profit of $3 - $1 = $2, and the value to the seller (and Google) is $1. We think efficiency is important because it represents the total size of the pie").

291 *See, e.g.,* GOOG-AT-MDL-004522085, at -088 (02/2017)("Machine learning powers GDN automation, scale and results; [u]nique data that informs accurate and differentiated targeting across devices; [u]nparalleled optimization and precision that gets smarter over time; [a]uction-time signals used to capture audience and contextual relevance for every impression. … All of these signals means we have a lot of data to work with, but that's not enough --- it's almost important to have the intelligence to derive meaning from those signals and make real-time decisions around bidding, targeting and optimization. … We're thus able to optimize with the same level of rigor that you would, but with exponentially more data, scale and precision.").

292 Academic literature has found that "[m]ore precise targeting generally increases ad effectiveness by delivering ads that are in consumers' interests." For that reason, advertisers may "augment their own proprietary data (e.g., purchase patterns on the advertiser's website) with additional data bought from third parties (e.g., income level, job history, home ownership, monthly car payment) to build targeting audience profiles" while "[p]ublishers seek to integrate their own proprietary data (e.g., user registration information and ad viewing patterns on the publisher's website) with third-party data to build user segments and to offer better targeting options to advertisers at potentially higher prices." Hana Choi,

(218) Second, on the advertiser side, data is used to help advertisers formulate bidding strategies such as predicting competitors bids.[293] Data also informs which impressions to bid on.[294] Data is also important to make predictions for offering CPC/CPM conversions within advertiser ad networks such as Google Ads.[295]

(219) Third, on the publisher side, data is used to help publishers optimize inventory and auction settings. For example, DFP contains an inventory forecasting feature, which uses "unsampled historical traffic from the last 24 months or more as a basis to build and predict future traffic volumes."[296]

Carl F. Mela, Santiago R. Balseiro, and Adam Leary, "Online Display Advertising Markets: A Literature Review and Future Directions," *Information Systems Research* 31, no. 2 (2020), 563, 558. Theoretical models have also shown that improved targeting can increase advertisers' value. *See, e.g.*, Dirk Bergemann and Alessandro Bonatti, "Targeting in Advertising Markets: Implications for Offline Versus Online Media," *RAND Journal of Economics* 42, no. 3 (2011), 417–433.

293 Google October 2, 2021 response to EC Questionnaire received on July 12, 2021, GOOG-AT-MDL-010636992, at -001 (10/2021) (describing data used by Google Ads to determine the amount it bids, including results of previous auctions that Google Ads has bid on); *see also* GOOG-DOJ-AT-00292252, at -264–66 (A 2019 Google deck recognizes that data is important for bid optimization "If we knew our competitor's bid exactly, we can simply bid a cent above that…But we don't have this information before the auction, so we need to predict competitor's bid… the optimal bid depends on the shape of the distribution not only the mean…." To predict competitor's bids, Google developed "smart bidding" which "use[d] [Machine Learning] to model this [Highest Other Bid] and the uncertainty in the estimate" to "maximize advertiser surplus.").

294 For example, Google Ads uses a technique called throttling, in which a machine learning model helps decide which impressions to bid on. *See* Google October 2, 2021 response to EC Questionnaire received on July 12, 2021, GOOG-AT-MDL-010636992, at -999 (10/2021) ("Google Ads receives billions of bid requests every day. Bidding is a very resource intensive process, and it is impossible to respond to every one of these bid requests because of the constraint on the number of machines available…The purpose of the throttler is to identify bid requests that are likely most valuable to advertisers and that fit within the limits of machine availability…The throttler is driven by a machine learning model that predicts the value of the bid request using historical data on win/loss information for similar queries that Google has bid on in the past. The goal of this machine learning model is to predict the average advertiser value given various features of the bid request. Some of these bid request features include the publisher domain, URL, adslot dimensions, and language. The model only uses information in the SSP's bid request and the historical win/loss data described above.").

295 *See*, *e.g.*, Google October 2, 2021 response to EC Questionnaire received on July 12, 2021, GOOG-AT-MDL-010636992, at -004 (10/2021) ("The pCTR model predicts the probability of getting a click. Each pCTR model trains on a set of training examples; each example consists of a series of input features and a label. The model is periodically updated as new training data becomes available."). pCTR is an input into CPC to CPM conversion. *See, e.g.,* Google Response to the FCA dated July 23, 2019, Response 48, GOOG-DOJ-05782415, at -460-011. *See, e.g.,* GOOG-DOJ-03707195, at -199 (A 2013 GDN Cross-Exchange Remarketing deck explains that "Google is converting advertiser CPC bids to CPM bids on the exchanges, and charging a margin. To do so, we need to understand how the exchanges' auction models work so that we can bid appropriately."); GOOG-DOJ-07833243, at -246 (02/12/2019) (In 2019, Google employees discussed Google's decision to transition from paying "AdMob (and likely AdSense) publishers" for clicks to paying for impressions ("CPC > CPM migration") noting that, "[i]n aggregate, our predictions are pretty good. Even on medium-large publishers there is enough traffic that we can get statistical significance. So the under/overpayment risk is really only present for small apps where we don't see enough traffic to make predictions better than network-wide averages (or brand new apps in the first few days as the models learn the inventory)." The email also noted, "we already do this for DRX publishers (who are generally larger so there's less risk).").

296 *See* Google, "How forecasting works," Google Ad Manager Help, accessed December 15, 2023, https://support.google.com/admanager/answer/7649125. *See also* Google Response to the FCA dated July 23, 2019, Response 82. GOOG-DOJ-05782415, at 449–450 (09/2019) ("Google Ad Manager collects data to provide the relevant service, including: To forecast available traffic (e.g., the number of potential ad impressions available to an ad campaign target to a specific country or device type"); and GOOG-TEX-00069082, at -129 (05/2010) (A 2010 "DoubleClick Ad Exchange" deck describes that "DFP's optimization technology gives publishers the opportunity to utilize advanced Google machine learning algorithms to deliver even greater campaign performance lift for advertisers. …Thanks to the speed and processing power offered by Google's infrastructure, we can now provide more reporting data to help

Additionally, ad tech products can use historical bid data to improve their expected monetization for publishers.[297]

(220) Last, scale is also important for running experiments used to evaluate new features and products. Google often runs experiments that measure the impact of changes to its ad tech products before launching product changes,[298] and its research has acknowledged that "Google has a robust experimental infrastructure for running randomized A/B experiments."[299]

(221) A December 2015 Google document outlines the "life of a launch" for Google Display Network changes, and describes some of Google's infrastructure for running experiments.[300] This document lists "Run experiment & collect data" as the first step in the "Launch Review Workflow",[301] and notes that bigger experiments (i.e., those that are run at a greater scale and generate more data) result in more precise findings: "Typically launches run for ~1 week at 5%. You may need to run longer or at higher traffic if confidence intervals are too wide."[302] Moreover, another Google document indicated that it had enough data and publisher customers to apply an experiment to a small share of each publisher's traffic (so as not to materially affect the publisher's revenue) while still obtaining a large aggregate amount of traffic.[303]

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publishers understand where their revenue is coming from with a new level of granularity. … Add this all up and DoubleClick customers should have an average of 4,000 times more data at their fingertips. We have also used this unprecedented volume of data to improve the accuracy and depth of the new DFP's forecasting engine and availability forecasting reports.").

[297] For example, historical bid data is used by Google to dynamically set reserve prices across exchanges within DFP (see Section III.E for a discussion of how reserve prices can increase expected revenues for a seller in an auction). GOOG-DOJ-AT-00598721, at -723 (09/2019) (According to a 2019 Google document, "the goal of Reserve Price Optimization (RPO) is to increase publisher revenue by extracting a higher yield from buyers by dynamically setting AdX auction reserve prices. These reserve prices are computed via a statistical model that uses the bid distribution for chosen ad-query features."). *See also* GOOG-DOJ-09183023, at -034 (10/2019) (A 2020 Product and Business Strategy document states that Google uses data and machine learning techniques to "Maximize revenue in the unified auction, while protecting the long-term value of publisher's inventory by using rich data and Google's machine learning expertise (e.g., to intelligently set price floors that more closely reflect the how [sic] buyers value the inventory).").

[298] *See*, *e.g.*, GOOG-DOJ-AT-00292252, at -272 (10/2019) (A 2019 Google deck examining the performance of bidding algorithms into first-price auctions on AdWords and DV360 revenues). *See also* Section VII where experiments underlying Google's programs are described.

[299] Deepak Ravichandran and Nitish Korula, "Effect of Disabling Third-Party Cookies on Publisher Revenue," Google Services, last modified August 27, 2019, *available at* https://services.google.com/fh/files/misc/disabling_third-party_cookies_publisher_revenue.pdf. Google highlighted this research in its Ads & Commerce Blog. *See* Chetna Bindra, "Next Steps to Ensure Transparency, Choice and Control in Digital Advertising," *Google Ads & Commerce Blog*, last modified August 22, 2019, *available at* https://blog.google/products/ads/next-steps-transparency-choice-control/.

[300] GOOG-DOJ-AT-00475378, at -380 (12/2015) (Defines a "launch" as "any new code that affects the existing Google Display Network advertisers or publishers.").

[301] GOOG-DOJ-AT-00475378, at -383 (12/2015).

[302] GOOG-DOJ-AT-00475378, at -391 (12/2015).

[303] Deepak Ravichandran and Nitish Korula, "Effect of Disabling Third-Party Cookies on Publisher Revenue," Google Services, last modified, August 27, 2019, *available at* https://services.google.com/fh/files/misc/disabling_third-party_cookies_publisher_revenue.pdf ("The experiment was applied to a small fraction of each publisher's traffic because we did not want to materially affect publisher revenue, though in aggregate the amount of traffic evaluated as

(222) Consistent with the importance of scale for experimentation, John Gentry, CEO of the ad exchange OpenX, testified, "The greater the amount of scale you have, the more that you can experiment across that scale."[304]

(223) **Data and the profitability of ad tech products.** Data also can help a firm improve the profitability of its ad tech products. For example, documents and testimony show that dynamic pricing projects such as AdX Dynamic Revenue Sharing (DRS)[305] and Google Ads' Project Bernanke[306] improved Google's profitability and also relied on data provided at scale.

(224) **Third-party testimony recognizes the importance of data and scale.** Industry participants also recognize the value of data for improving the quality of ad tech products and increasing profitability.

- Adam Soroca, Chief Product Officer of Magnite, testified that "fundamental mechanics of the ad server and AdX integration…limit[Magnite's] ability to grow" and "to get [greater] scale."[307] He explained that scale is important to exchange competition because "[t]he bigger you are…the more data flows through your system and the better you can optimize your algorithms…the larger the deal size is that you can bring onto your platform through the buy side…the more your ability is to…grow your business on top of what's already a fixed cost basis and become more profitable."[308]

part of the experiment was significant.").

304 Deposition of John Gentry (OpenX), October 26, 2023, at 78:23–25. *See also* Deposition of John Gentry (OpenX), October 26, 2023, at 78:18–79:19 ("Q. If OpenX were to have more scale compared to what it has today, what impact, if any, would that have on OpenX's ability to effectively run experiments on its traffic to improve its products? […] A. The greater the amount of scale you have, the more that you can experiment across that scale. So simple answer, if I'm experimenting across ten publishers, that's a very limited data set. If I'm experimenting across traffic coming probably over a thousand publishers, I'm getting a far broader traffic set and far more insights into how something might behave. Q. So comparing AdX and OpenX, which exchange do you think would be more effective at running experiments to improve the exchange based on a portion of the exchange's traffic? A. AdX. […]Q. And why? A. Because they've got a broader – they've got broader scale and they've got a broader amount of data and a broader amount of requests from which to run tests.").

305 *See* Section VII.D.1.b for a discussion of AdX DRS. *See also* GOOG-DOJ-11760096, at -096 (09/2014) (A 2014 Dynamic Sell-Side Revshare deck states that DRS is "[o]ne of ongoing experiments with AdX auction running now & ongoing….Experiments optimize net rev to pubs (& Google) by adjusting mins/floors, bids, prices, reserves for fractions of auction traffic.").

306 *See* Appendix L.4 for a discussion of Project Bernanke. *See also* GOOG-DOJ-10733927, at -940 (07/2018) (Project Bernanke allowed Google to increase margins for AdWords bids into AdX and third-party exchanges through "bidding technology that formulates and solves an optimization problem to maximize revenue while constraining margin per publisher."); GOOG-DOJ-06842351, at -362 (10/2013) (According to an October 2013 deck, the overall impact of Bernanke was a 7.3% increase in advertiser spend, a 20% increase in GDN profit, a 7% increase in AdX profit, and a 7% increase in publisher revenue.); GOOG-AT-MDL006218271, at -286 (01/2023) ("Bernanke started modelling, via machine learning, expected bids in prospective auctions based on bid data from past auctions. That is, it uses the distribution of the predicted highest other bid ("pHOB") in the unified auction to do so (which is not something it needed to do in a second-price auction for the reasons explained in the response to Question 13 of the EC's RFI 10 submitted to the EC on 12 December 2022.").

307 Deposition of Adam Soroca (Magnite), August 31, 2023, 65:15–66:21.

308 Deposition of Adam Soroca (Magnite), August 31, 2023, 65:4–14.

- Benneaser John, Vice President of Engineering at Microsoft, testified that if exchanges get more supply from publishers, their algorithms learn and can monetize better.[309]
- John Dederick, Clief Client Officer for The Trade Desk, testified that, "[S]cale also affords data because, of course, in today's ecosystem, we are collecting vast sums of data and we are using that to inform our companies and our strategies and so with more scale comes more data and so that's a virtuous cycle."[310]
- Andrew Casale, President and CEO of Index Exchange, testified that when an exchange clears more transactions it can solve pricing problems better.[311] Casale further testified that scale enables exchanges to set dynamic take rates.[312] Casale also testified, "From a pure mechanical perspective…there are a whole host of optimizations that scale fee[d]s. It feeds the ML models that drive these optimizations. The less scale you have, the less perfect your decisions will be, the less competitive you'll be."[313]

III.E. Economics of auctions

(225) A substantial share of open-web display advertising is currently sold via auction using ad tech products (see Section II.A.4). In this Section, I overview of basic economic concepts regarding auctions, which provides useful context for the products and conduct covered by this report.

(226) An auction is a sales process characterized by the simultaneous consideration of offers ("bids") from multiple interested buyers. Auctions are often used for price discovery when the items being sold are not the same and the number of potential buyers varies, and can result in greater revenues for sellers

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309 Deposition of Benneaser John (Microsoft), September 8, 2023, 215:21–216:9 ("Q. What connection, if any, is there between the winner-take-most dynamic for SSPs for display and the sophisticated algorithms that you described? A. That is one part of it. And the more the publisher wins, the algorithms learn and get optimized. And that's where, you know, that's called machine learn. It gets a sample set, it achieves to itself and it improves by itself. And if we get the more supply and if we make the supply algorithms learn, the supply will be able to make those supply wins and monetize better.").

310 Deposition of John Dederick (The Trade Desk), July 28, 2023, 254:15–255:22.

311 Deposition of Andrew Casale (Index Exchange), September 26, 2023, at 213:3–18 ("There is a great advantage to an exchange clearing more transactions. I think I referenced this earlier, but there are significant optimization problems that we are tasked with solving, pricing being one key problem and curation being another. The more transactions you clear, the more data you have to feed ML and data science to solve those problems in a superior way.").

312 Deposition of Andrew Casale (Index Exchange), September 26, 2023, at 216:19–217:16 ("Q. How, if at all, is scale important to effectively employ dynamic revenue share, dynamic take rates? [...] A. It feeds right back to that optimization concept that I articulated, just in another context. The more scale of transactions that you're privy to, the more accurately you can determine a predicted win rate at every price point with those predictions being highly reliable, you can then determine where the competition lies. And so a simple example would be if you've determined that there's a lot of competition at a dollar, take a low take rate. If you determine that there's not a lot of competition at $20, make more money and in short you can significantly grow your win rate.").

313 Deposition of Andrew Casale (Index Exchange), September 26, 2023, 236:22–238:6.

IV. Market definition

(241) Market definition is a tool for analyzing antitrust and monopolization claims. Defining relevant antitrust markets identifies a set of products over which an alleged or potential monopolist could possess and exercise market power. In doing so, it assists in the evaluation of whether the alleged or potential monopolist is able to engage in exclusionary conduct and whether such conduct likely harms competition and customers.

(242) Market definition is helpful for at least two reasons. First, market definition focuses attention on and delineate where potential competitive effects from particular conduct are most likely to occur. Second, market definition allows for the calculation of market shares and concentration measures which can be useful for examining the extent of market power. However, as I discuss further below, the market definition exercise properly applied does not necessarily lead to a single antitrust market. Appropriate relevant markets are those that help evaluate the competitive effects of the conduct at issue.

(243) In this section, I evaluate relevant antitrust markets for examining Google's market power and the competitive effects of its conduct on open-web display ad tech products.[330]

(244) A relevant market has both a product and geographic dimension.[331] In this matter, the complaint alleges three relevant product markets: *publisher ad servers*, *ad exchanges*, and *advertiser ad networks* that can be used to serve or transact open-web display advertising. The complaint also alleges a worldwide (with some countries and regions excluded) and United States geographic market for each of these product markets. In this section, I explain why each of these three product markets is a relevant product market, and why both the whole world (excluding certain countries and regions) and the United States are relevant geographic markets for each product market.[332]

(245) This section is organized as follows.

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[330] As I discussed in Section I.B, I was asked by counsel at the Department of Justice to "determine whether publisher ad servers, ad exchanges, and advertiser ad networks for open-web display advertising, both worldwide (excluding countries like the People's Republic of China that substantially restrict internet access) and in the United States, are relevant antitrust markets for the purpose of evaluating Google's market power and the alleged anticompetitive conduct."

[331] United States Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines,* August 19, 2010 (hereinafter, "HMG"), § 4 ("market definition helps specify the line of commerce and section of the country in which the competitive concern arises."). Additionally, using the label "relevant" serves to differentiate the analytic construct of a relevant market from other uses of the term "market": *see* HMG § 4 ("Relevant antitrust markets defined according to the hypothetical monopolist test are not always intuitive and may not align with how industry members use the term 'market.'"); Jonathan B. Baker, "Market Definition: An Analytical Overview," *Antitrust Law Journal* 74, no. 1 (2007): 130 (labeling markets as relevant or antitrust markets "distinguish[es] these markets from what business executives and consultants might define for other purposes.").

[332] My conclusions regarding Google's market power in the relevant product markets and the competitive effects of its conduct are not changed whether I consider a worldwide or US geographic market.

- In Section IV.A, I discuss economic issues regarding market definition for monopolization claims in ad tech products, and describe the economic framework that I use to define relevant antitrust markets.[333]
- In Section IV.B, I describe why open-web display advertising is an important and distinct form of advertising for open-web publishers and advertisers. Note that the relevant product markets do not contain the underlying display advertisements themselves, but rather the ad tech products used to serve and transact these ads. Nonetheless, focusing on the distinction between display and other forms of advertising clarifies why ad tech products that transact open-web display ads are particularly valued by publishers and advertisers, and why products that do not offer such functionalities are not close substitutes. In this Section, I also discuss why indirect deals for open-web display advertising provide distinct value to publishers and advertisers compared to other forms of transacting display advertising.
- In Sections IV.C–IV.E, I explain why *publisher ad servers*, *ad exchanges*, and *advertiser ad networks*—ad tech products that are used by publishers and advertisers to serve and transact open-web display advertising—are each relevant product markets.
- In Section IV.F, I explain why worldwide (excluding certain countries and regions) and the United States are both appropriate relevant geographic markets for all three relevant product markets.

IV.A. Market definition for monopolization claims in the ad tech stack

(246) For purposes of evaluating the monopolization claims in this matter, a relevant market contains products offered by the alleged monopolist (Google) and those alternative products that would impose significant competitive constraints on Google's products were Google's products priced at competitive levels. Focusing on alternatives that would constrain Google's exercise of market power were its products priced at competitive levels is important, as it identifies alternatives that, if not (potentially already) weakened or eliminated by Google's anticompetitive conduct, would prevent Google from exercising or continuing to exercise market power to the detriment of customers and consumers. Importantly, products that lie *outside* of the relevant market are relatively poor substitutes for competitively-priced products within the market, and customer substitution to these products would not be sufficient to constrain Google's ability to exercise market power in the relevant markets at issue.

(247) As made clear by this discussion, market definition focuses on the ability and willingness of customers to substitute among different products.[334] Relevant markets must contain enough

[333] In this report, when I say that I "define" relevant markets, I mean that I am evaluating whether the markets as described in my assignment are relevant antitrust markets.

[334] HMG, § 4 ("Market definition focuses solely on demand substitution factors, i.e., on customers' ability and willingness

reasonably close substitutes so that an exercise of significant market power by a monopolist of such products would not be rendered unprofitable by sufficient customer substitution to products outside of the market; but at the same time, a relevant market does not necessarily (or typically) include *all* potential substitutes for those products, since it is not necessary to control (or eliminate) all potential substitutes for a monopolist to exercise significant market power.

IV.A.1. The hypothetical monopolist test for monopolization claims

(248) To determine whether a set of products (within a geographic area) comprises a relevant market for the purposes of evaluating monopolization claims, I evaluate whether a "hypothetical monopolist" that owned these products would likely sell at least some of its products profitably to some set of customers at (quality-adjusted) prices[335] that significantly exceed levels that would be charged in a competitive market.

(249) Whether a set of products comprising a relevant market can profitably be monopolized depends on customer substitution patterns. To see why, consider a candidate set of products being evaluated as a possible relevant product market. If a hypothetical monopolist of this set of products would not maximize its profits by charging prices significantly above competitive levels, then there likely exists substantial customer substitution to alternative products *outside* of the candidate market if prices increased from competitive levels. In this case, the candidate market is too narrow and excludes products that are close substitutes to products within the market. If, in contrast, a hypothetical monopolist of a set of products would maximize its profits by charging prices significantly above competitive levels, then products outside of the market are not close substitutes for competitively-priced products within the market, and do not constrain the exercise of market power by the monopolist. In this case, the candidate set of products forms a relevant product market for the purposes of evaluating a monopolization claim.

(250) This economic framework for defining relevant markets is the "hypothetical monopolist test" (HMT) which is commonly used to define markets for the analysis of horizontal mergers.[336] However, there

to substitute away from one product to another in response to a price increase or a corresponding non-price change such as a reduction in product quality or service").

[335] The discussion in this Section uses a price increase as the focal means of exercising market power for a hypothetical monopolist. However, market power can also be exercised by reducing product quality, which can have the effect of reducing costs or increasing customer demand for the firm's other products on which the firm earns supracompetitive profits. The term "quality-adjusted" refers to the possibility that a firm (e.g., the alleged or hypothetical monopolist) would choose to exercise its market power not necessarily by increasing price, but potentially by reducing the quality of a product below that which would be offered in a competitive market. Lowering a product's quality while holding its price fixed is referred to in economics as increasing the quality-adjusted price for the product. In my report, a reference to a "price increase" includes this possibility of a quality-adjusted price increase. *See* HMG §1 ("Enhanced market power can also be manifested in non-price terms and conditions that adversely affect customers, including reduced product quality, reduced product variety, reduced service or diminished innovation.").

[336] HMG §§ 4, 4.1.1 ("The hypothetical monopolist test requires that a product market contain enough substitute products so that it could be subject to post-merger exercise of market power significantly exceeding that existing absent the

is an important difference in implementing the HMT for monopolization claims. In a horizontal merger case, the HMT examines whether a hypothetical monopolist can increase prices for a set of products significantly above *those that would likely be charged absent the merger*, which often are taken to be prevailing pre-merger prices.[337] By evaluating price increases starting from prevailing prices, the HMT in a horizontal merger setting aims to identify products that would likely constrain the merging parties from engaging in an exercise of increased market power following the merger.

(251) In contrast, for monopolization claims, the HMT considers customer substitution patterns at the benchmark of competitive prices.[338] This is because an important concern is that *prevailing prices may already reflect the exercise of substantial market power by the alleged monopolist*.[339] At such elevated prices, consumers would likely substitute away from the alleged monopolist's products to alternatives were the alleged monopolist to impose a further price increase—even if those alternatives are not close substitutes for the alleged monopolist's products *were the monopolist's products priced more competitively*. When there is a concern that prevailing prices (or product qualities) depart significantly from those that would otherwise obtain in a more competitive environment, relying on observed customer substitution patterns at existing price or quality levels risks overstating the competitive significance of more distant substitutes that customers only turn to after a set of products has already been monopolized.[340] Hence, quantitative estimates of demand elasticities and other

merger. Specifically, the test requires that a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future seller of those products ("hypothetical monopolist") likely would impose at least a small but significant and non-transitory increase in price ("SSNIP") on at least one product in the market, including at least one product sold by one of the merging firms.").

337 HMG §§ 4, 4.1.2 ("The Agencies apply the SSNIP [small but significant and non-transitory increase in price] starting from prices that would likely prevail absent the merger. If prices are not likely to change absent the merger, these benchmark prices can reasonably be taken to be the prices prevailing prior to the merger. If prices are likely to change absent the merger, e.g., because of innovation or entry, the Agencies may use anticipated future prices as the benchmark for the test.").

338 By competitive prices, I am referring to prices that likely would be offered if there were multiple efficient providers of similar and functionally substitutable products, limited not only to those currently available from existing market participants (e.g., products that could have been or could be offered by existing, past, or potential market participants). By using this benchmark level of prices in the hypothetical monopolist test (defined below), I seek to identify a set of products that could be, or *could already have been*, profitably monopolized.

339 Indeed, acknowledging issues with using consumer substitution at observed prevailing prices to define markets in monopolization cases, the *Horizontal Merger Guidelines* note that a monopolist's current prices may already reflect the exercise of its market power and that market definition in such cases will differ from evaluating horizontal mergers. HMG at fn. 5 ("Market definition for the evaluation of non-merger antitrust concerns such as monopolization or facilitating practices will differ [from mergers] in this respect [referring to the relevant benchmark for prices] if the effects resulting from the conduct of concern are already occurring at the time of evaluation.").

340 Phillip E. Areeda and Herbert Hovenkamp, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, 4th and 5th ed., cum sup. 2013–2020 (New York: CCH Incorporated, 2020), ¶ 539 ("A first approximation 'provisional market' is in fact a relevant antitrust market if its prices are already significantly supracompetitive. Such a market definition would be incorrectly broadened by adding a second product or region that would make a further price increase unprofitable to the first firm or set of firms. To put it another way, in seeking out a profit-maximizing price the monopolist or oligopolist finds a price so high that a still further price increase would be unprofitable because too many sales would be lost."). *See also* Massimo Motta, *Competition Policy: Theory and Practice*, (New York: Cambridge University Press, 2004), 105 ("Suppose for instance that the firm is the only seller in the correctly defined product market. Being a monopolist, it might have set its prices at such a high level that a further increase above the current prices would not be profitable. Therefore, the [HMT] test [using the monopolist's current prices as the competitive

measures of customer substitution computed at prevailing or historically observed prices will typically be less useful for defining markets for monopolization claims than for horizontal mergers.[341]

(252) Where it is possible that prevailing prices exceed competitive levels, it is useful to consider two categories of evidence that can inform whether competition from products outside the relevant product markets significantly constrains a hypothetical monopolist of products within a market from exercising market power.

(253) First, product characteristics and customer behavior can indicate products outside of each relevant market are not close enough substitutes for competitively-priced products within each relevant market to constrain a monopolist of all such products from exercising significant market power. I provide such evidence in this section. In particular,

- I discuss evidence that open-web display advertising is a distinct and important form of advertising and monetization for advertisers and publishers, and that publisher ad servers, ad

benchmark] might lead to a too-wide market definition, which in turn might lead to a calculation of small market shares, and to a finding of no dominance, for the firm under investigation.").

Relying on substitution patterns to identify substitutes at already "supracompetitive" prices has been referred to as the "Cellophane Fallacy" *See* Steven C. Salop, "The First Principles Approach to Antitrust, Kodak, and Antitrust at the Millennium," *Antitrust Law Journal*, vol. 68, (2000), 188 –189, 197 ("[M]arket power should be measured as the power profitably to raise or maintain price above the competitive benchmark price, which is the price that would prevail in the absence of the alleged anticompetitive restraint. The competitive benchmark may be the current price, the perfectly competitive price, or some other in-between price, depending on the particular allegations of anticompetitive effect being asserted. …Suppose, for example, that the antitrust allegation is that certain conduct has already permitted a firm to raise its price. In these circumstances, the proper competitive benchmark is not the current price. Instead, it is the lower price that would have prevailed absent the alleged restraint. If the current price is used as the competitive benchmark, the result will be an erroneous finding of no market power. This is the error that occurred in the Du Pont case, which now is explained under the rubric of the Cellophane Trap, or Cellophane Fallacy. There, Du Pont engaged in a variety of conduct that eliminated competition, permitting Du Pont to raise its price. The Court, however, evaluated market definition as a threshold filter that focused on the profitability of price increases above the already achieved monopolized price. That hypothetical price increase was found to be unprofitable, leading the Court to affirm the finding of a broad market and a lack of market power by Du Pont.") (emphases suppressed). *See also* Gene C. Schaerr, "The Cellophane Fallacy and the Justice Department's Guidelines for Horizontal Mergers," *Yale Law Journal* 94, no. 3 (1985), 670–93.

[341] *See, e.g.,* Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization*, 4th ed. (Boston: Addison-Wesley, 2005), 646–647 ("Just because a monopolized product faces close demand substitutes at monopoly price, it does not follow that the firm producing the product has no market power (though it may not be able to raise price further). It is only if the substitution possibilities are so large as to generate a highly elastic residual demand that the monopoly has no significant market power. Because it is difficult to determine which products to include in the market definition, market shares may be only a crude indicator of market power. The *Cellophane* case illustrates these difficulties in defining a market. The Court investigated whether du Pont had market power in the pricing of cellophane. The Court reasoned that du Pont lacked market power because, at the current market prices, a user of cellophane had many substitutes, such as paper bags, and du Pont's share of the market including these substitutes was not large. There was also evidence, however, that price substantially exceeded marginal cost. Based on the foregoing discussion, it was an error to include other wrapping materials in the market definition because they did not prevent the exercise of market power and constrain the price of cellophane to competitive levels. If, however, instead of asking whether du Pont had market power, the Court had investigated whether a proposed merger would raise the cellophane price, its market definition might have been appropriate.").

exchanges and advertiser ad networks that facilitate the serving and sale of such advertising are each distinct sets of products without close substitutes for *either* advertisers or publishers.[342]

- I also discuss evidence that industry participants recognize products in each relevant market as offering features and capabilities to customers that are not offered by products outside of the market, which is also consistent with the conclusion that a hypothetical monopolist of products within the market would not be constrained from charging prices above competitive levels.
- I also provide quantitative evidence that supports the finding that products outside the market are not close substitutes from customers' perspectives.

(254) Second, I present direct evidence that Google possesses substantial and sustained market power with its publisher ad server (DFP), ad exchange (AdX), and advertiser ad network (Google Ads) products. Such evidence indicates that these are proper relevant markets: because Google was able to profitably exercise market power in these markets, a hypothetical monopolist that controlled Google's products as well as their close substitutes would also find it profitable to do so.[343] Direct evidence of Google's market power for these products includes Google's pricing behavior and ability to profitably implement certain policies contrary to the interests of publishers and/or advertisers without a sufficient competitive response to constrain Google's actions. This evidence shows that these relevant markets can be profitably monopolized.[344] Evidence of Google's market power over products contained within the relevant markets also demonstrates that potential constraints imposed by indirect network effects (or Google's sale of multiple complementary products) do not prevent it—nor a hypothetical monopolist within each market—from charging quality-adjusted prices above competitive levels.

IV.A.2. Relevant markets typically exclude some substitutes, and may exclude alternatives that are used alongside products within the relevant markets

(255) Despite its usefulness in productively focusing attention on areas where competitive concerns may arise, market definition is not "an end in itself" and is one of several tools that assist with the analysis

342 Recall from Section III.B that an ad tech product will possess market power as long as *either* the advertisers or publishers that use it do not have close substitutes to turn to. Hence, as long as one set of customers (advertisers or publishers) lack close substitutes for a set of products, a monopolist of those products will be able to exercise market power and those products would comprise a relevant market.

343 *See* Phillip E. Areeda and Herbert Hovenkamp, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, 4th and 5th ed., cum sup. 2013–2020 (New York: CCH Incorporated, 2020), ¶ 539b1 ("Where the provisional *A* grouping [of products] includes all reasonable substitutes made in the same region and by similar technology, substantial excess profits, prices significantly above marginal costs, or some instances of price discrimination reveal market power within that grouping. That conclusion overcomes the presumptive methodology for broadening the market. Indeed, there is seldom any reason to do more than conclude that the *A* grouping defines a market, once we know that the *A* firms possess substantial market power.").

344 Notably, this direct evidence does not involve market shares computed for a given set of products (which would depend upon having defined a relevant market).

of competitive effects.[345] In particular, since market definition involves labeling products as inside or outside of a market, it inevitably draws a discrete boundary around products even when there are more nuanced measures of firms' competitive positions.[346]

(256) One implication is that a relevant market will often exclude products that *some* customers view as substitutes for products within the market.[347] The key consideration when defining markets for monopolization claims is whether those excluded substitutes pose a *significant enough competitive constraint* on products contained within the market so as to prevent a hypothetical monopolist of those products from exercising market power and charging prices above competitive levels. By excluding alternative products that would be unlikely to constrain a monopolist (e.g., because a sufficient number of consumers view those alternatives as poor substitutes for products within the market), market definition facilitates the calculation of market shares and concentration measures that do not overstate the competitive significance of distant substitutes.[348]

(257) This is important to bear in mind when defining markets for products that facilitate the serving and sale of open-web display advertising, as there exist products outside of the relevant markets defined in this report that may be used alongside products within the relevant markets by advertisers or publishers.[349] Similarly, a publisher may use multiple transaction types, including direct guaranteed deals as well as indirect deals. In addition, an advertiser may elect to purchase online display advertising on both open-web publishers and mobile apps, or use both video and display ads for a particular advertising campaign.

(258) However, even though there may exist substitution "on the margin" between multiple digital advertising options—e.g., a publisher might be willing to monetize *some* impressions via a direct deal

[345] *See, e.g.,* HMG § 4 ("When the Agencies identify a potential competitive concern with a horizontal merger, market definition plays two roles. First, market definition helps specify the line of commerce and section of the country in which the competitive concern arises. In any merger enforcement action, the Agencies will normally identify one or more relevant markets in which the merger may substantially lessen competition. Second, market definition allows the Agencies to identify market participants and measure market shares and market concentration. *See* Section 5. The measurement of market shares and market concentration is not an end in itself, but is useful to the extent it illuminates the merger's likely competitive effects.").

[346] HMG § 4 ("[D]efining a market to include some substitutes and exclude others is inevitably a simplification that cannot capture the full variation in the extent to which different products compete against each other… Relevant markets need not have precise metes and bounds.").

[347] HMG, § 4.1.1 ("Groups of products may satisfy the hypothetical monopolist test without including the full range of substitutes from which customers choose. The hypothetical monopolist test may identify a group of products as a relevant market even if customers would substitute significantly to products outside that group in response to a price increase.").

[348] HMG, § 4 ("Market shares of different products in narrowly defined markets are more likely to capture the relative competitive significance of these products, and often more accurately reflect competition between close substitutes. As a result, properly defined antitrust markets often exclude some substitutes to which some customers might turn in the face of a price increase even if such substitutes provide alternatives for those customers.").

[349] For example, an open-web publisher may choose to monetize parts of its website using display advertising using a publisher ad server, and other parts of its website (such as at the bottom of one of its "interior" or non-home/non-landing pages) using content recommendation advertising products. *See* discussion of content recommendation engines in Section II.A; *see also* discussion in Section IV.B.1.

or an indirect transaction, or an advertiser might move *some* spending from open-web display to instream video advertising—this does not on its own invalidate a relevant antitrust market that contains products that facilitate the sale of open-web display advertising. Substitution for only a small subset of impressions or spending is not the same as a publisher or advertiser substituting more substantially away from a particular product or form of monetization. Indeed, publishers often use several approaches to monetize their open-web inventory. Different monetization sources may be complements as opposed to substitutes, and efficient monetization may often rely upon being able to use distinct means in conjunction with one another.[350] As long as a set of competitively-priced products more efficiently monetize open-web inventory for publishers or more effectively accomplish a particular need for advertisers than alternatives, those products likely will be able to be profitably monopolized and comprise a relevant product market.

(259) As an analogy, to be able to perform a wide variety of repairs around the home, a person likely needs to have both a screwdriver and a hammer in their toolbox. Although a screwdriver and a screw might be able to accomplish what a hammer and a nail could do for some tasks (for instance, hanging a picture on the wall), this does not mean that someone would be able to do away with having a hammer altogether—there are tasks that a hammer is uniquely suited for and well positioned to perform. Indeed, it is unlikely that the existence of screwdrivers would be able to prevent a hypothetical monopolist of hammers from profitably charging prices above competitive levels. And vice versa: for the same reasons, it is unlikely that the existence of hammers would be able to prevent a hypothetical monopolist of screwdrivers from profitably charging prices above competitive levels.

(260) Similarly, even though some publishers may choose to monetize their online content using *both* in-stream video and display advertising, this fact alone does not mean a hypothetical monopolist of publisher ad servers for display advertising would be constrained in its ability to exercise market

[350] *See* GOOG-DOJ-13245481, at -482 (02/02/2011) (An email from Guillaume Ryder to Scott Spencer, Robby Stein, and Jonathan Bellack, reads, “Publishers fundamentally believe they get maximum yield through a broad mix of deal types – sponsorships, direct sold deals of CPM, CPC, or CPA type, direct network relationships for a fixed price with companies like Ad.com or AdLink, deals with revenue share networks like AdSense & other networks like it, private auctions with agency trading desks like Vivaki, cherry-picking deals with retargeting networks like Criteo in Europe, open auctions with real-time bidding, etc.”). On the complementary nature of direct and indirect (Open Auction) display transactions, *see* Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 62:21–67:12, (“Q. Why is Vox able to sell display ads to more advertisers through Open Auction than through direct display? A. Because of the nature of programmatic ad technology, there are – there can be many more buyers that – in an automated way that can have access to any individual display impression including those that Vox Media owns and sells. Q. What is performance advertising? A. Generally, it refers to advertising that is bought and sold on the – some element of performance, whether that’s a click or – click on an advertisement, or a sale or purchase for the advertiser...Q. And why, in your experience, is it very difficult to convert Open Auction display to direct display? A. Due to the performance-oriented nature of most – of Open Auction buyers, they are primarily looking for reaching a certain audience at a certain, typically, lower price than – than our direct ad business would support. Q. I think you said earlier that the CPMs for direct display are generally, on average, higher than the CPMs for Open Auction display; is that right? A. That’s correct...Q. Do you view Open Auction display and direct display as complements or substitutes?...A. I view them as complements...A. Again, generally, because the tactics of the advertiser and what they are looking to achieve are slightly different between direct ad sales and Open Auction.”).

power by ad servers that only facilitated the sale of instream video ads. A publisher's "monetization toolbox" will likely require many different sorts of tools.[351]

IV.B. Open-web display advertising is a distinct and important form of advertising for publishers and advertisers

(261) In this section, I discuss why open-web display advertising is a distinct and valuable form of advertising for open-web publishers and advertisers. Within open-web display advertising, I also discuss why *indirect* transactions in particular provide additional value to publishers and advertisers.

(262) Establishing the importance of open-web display advertising compared to other forms of advertising supports each of the relevant product markets that I discuss in Sections IV.C−IV.E below. This is because if open-web display advertising is distinct and valuable for open-web publishers and advertisers, then these customers would have limited ability to substitute away from *products used to transact such advertising* if those products were priced higher than competitive levels.

(263) For publishers and advertisers, open-web display advertising satisfies a particular functionality and use case more efficiently or effectively than alternatives. As I discuss in more detail below, digital advertising is distinct from "offline," or non-digital, advertising. In addition, within the broad category of digital advertising, there are important distinctions between open-web display advertising and other forms of digital advertising from the perspective of both publishers and advertisers that make them not close substitutes. Though the substitutability of open-web display advertising from alternatives will differ across these two sets of customers, as I discussed in Section III.B, products that facilitate the sale of open-web display advertising can comprise a relevant antitrust market even if *only* one of those two sets—publishers or advertisers—do not have close substitutes outside of the market.

(264) The rest of this Section is organized as follows:

- In Section IV.B.1, I discuss why publishers obtain distinct value from open-web display advertising relative to other sources of monetization, and why other forms of monetization—although potentially used alongside open-web display advertising for some publishers—are differentiated from publishers' perspectives.
- In Section IV.B.2, I discuss why advertisers obtain distinct value from open-web display advertising relative to other forms of digital and non-digital advertising, and why open-web

[351] Analogously, advertisers may engage in both search and display advertising at the same time, but this does not mean that search advertising tools constrain a hypothetical monopolist of open-web display ad tech products from exercising market power. As I discuss further below, display advertising has features that are distinct and valued by advertisers, and advertisers often use a portfolio of advertising products to achieve their goals and reach different audiences.

display advertising is differentiated from other forms of advertising from advertisers' perspectives.

- In Section IV.B.3, consistent with the above, I show evidence that Google and other industry participants recognize important distinctions between open-web display advertising and other forms of advertising.
- In Section IV.B.4, I discuss why indirect transactions, and RTB transactions in particular, for open-web display advertising provide additional distinct value to publishers and advertisers compared to direct transactions.

IV.B.1. Open-web display advertising is an important and distinct form of monetization for publishers

(265) Open-web publishers relying on advertising to monetize their digital content often use a portfolio of different forms of advertising.[352] In this Section, I discuss why open-web display advertising forms an important part of the monetization portfolio for open-web publishers, and why such publishers will tend to have limited ability to substitute away from display advertising to other forms of advertising. I also discuss why open-web publishers without their own integrated ad tech products cannot easily substitute to using integrated advertising tools to sell display advertising.

(266) Note that open-web publishers that monetize at least some of their web inventory via digital advertising would not likely find substituting completely away from advertising to a consumer-payment model (e.g., subscriptions) to be a close substitute. For publishers that do not currently have a consumer-payment model, adopting a new monetization strategy can be costly and difficult.[353] In particular, a publisher that attempts to adopt a consumer-payment model from scratch must induce consumers to pay for its content, market its product to new customers, and deliver enough value to keep its customers paying. For publishers that already have a consumer-payment model, substituting completely away from advertising would mean forgoing a valuable source of additional revenue.

IV.B.1.a. The sale of display advertising is distinct from other forms of advertising from the perspective of open-web publishers

(267) From the perspective of open-web publishers, the sale of display advertising is distinct from selling other forms of advertising. There are two primary reasons for this. First, a publisher may not have content that is suitable for other forms of advertising, such as instream video or in-app content.

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352 *See* Section IV.A.2.

353 As one academic paper notes, so-called "free-to-fee" changes between advertising to subscription-based models are challenging for publishers because of the tendency of consumers to place a lower value on free (or discounted) content and resist paying for content that had been free (or discounted). Pontus Huotari and Paavo Ritala, "When to Switch between Subscription-based and Ad-sponsored Business Models: Strategic Implications of Decreasing Content Novelty," *Journal of Business Research* 129 (2021), 14–28.

Second, even among the set of advertising options available to a publisher given its content, there is significant differentiation between display advertising and other forms of advertising.

IV.B.1.a.i. Publishers' advertising options are limited by the content they provide

(268) A publisher's options for using advertising to monetize a particular piece of online content is limited by the nature of the content itself.

(269) Perhaps most obviously, a publisher with *online* content cannot generally sell *offline* advertising to directly monetize that online content. Similarly, publishers cannot monetize their *web* properties by selling *in-app* ads.[354] Offline and in-app ads fundamentally monetize different advertising inventory than web ads.

(270) Additionally, even within web advertising, selling certain forms of digital advertising may not be available as an option to certain publishers based on the content or nature of their online business. For example, selling search ads is limited to publishers that display search result pages, selling in-feed social media ads is limited to publishers with social media content, selling instream video ads is limited to publishers with video content, and the use of sponsored listing or sponsored product ads is limited to publishers that provide product listings.[355]

IV.B.1.a.ii. Display advertising is differentiated from other available options from a publisher's perspective

(271) Even for publishers who have advertising options other than display advertising for the content they offer, display advertising is significantly differentiated from other forms of digital advertising.

(272) **Instream Video.** For publishers that do provide video content (potentially alongside "static" content), instream video ads and display ads are substantially different. This is for several reasons. First, instream ads are shown within a video player whereas display ads (including outstream video ads) are

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[354] Many online publishers also do not have a mobile app: Google data show that in 2022, 83% of AdX web publishers sold no mobile app or tablet app impressions (Google XPP-D data (DOJ RFP 7)). This figure excludes transactions where Google sold its owned-and-operated inventory through AdX.

[355] *See* GOOG-AT-MDL-003299671, at -673 (06/24/2021) (Google presentation "Sponsored Product Ads Project Guilder," June 24, 2021: "[Sponsored product] ads are ads that appear on a retailer's app or site, natively in search results, category pages, or product pages."); *see also* Deposition of Todd Parsons (Criteo), September 8, 2023 ("Q. …How does Criteo pitch its publisher ad server to publisher customers? A. The way that we -- that we pitch our ad server is to retailers who are looking to participate in retail media and commerce media. The way that we're pitching the server actually twofold; one is to help the retailer run what are called "sponsored product listings" on their website. Those are the listings that exist when you navigate to a product page, and an alternative product is sponsored and presented which you would see on Amazon, for instance. And then there is a second case which is we might serve a display advertisement on the retailer website along with a sponsored product or not. And that's a -- that second case is a little closer to the GAM execution, but we're talking about in the retail environment. Q. So is Criteo's publisher ad server focused on retail publishers? A. That's correct").

typically shown in "banner" ad locations at the top or side of publishers' webpages.[356] Thus, instream video and display ads occupy different parts of a publishers' digital ad inventory.

(273) Second, there are substantial price differences between open-web display ads and instream video ads. Testimony from Disney Executive Vice President of Advertising and Data Platforms Jeremy Helfant notes that there are substantial price differences between display and instream video advertising on Disney sites.[357] My analysis of Google data also shows that instream video ads have consistently higher average CPM than display advertisements: in 2022, the average CPMs for DV360 and Google Ads were [redacted] and [redacted] for instream video ads and [redacted] and [redacted] for display ads, respectively.[358]

(274) These price differences are consistent with instream video and display ads not being close substitutes from publishers' perspectives, and there being constraints on publishers' abilities to re-allocate their advertising space away from display ads and toward instream video ads to take advantage of the higher monetization rate.

(275) **In-app.** As discussed above, even for publishers that have both a mobile application and a web site, in-app and open-web display advertising are not close substitutes. This is primarily because *in-app* display ads cannot monetize the publisher's *web* inventory (and vice versa); such a publisher would likely use both in-app and open-web display ads if it chose to monetize its digital properties with display advertising. Additionally, web impressions and app impressions for such publishers may attract different audiences and users.[359] Among publishers using AdX who offer both web and mobile app inventory, the average share of impressions derived from web pages in 2022 is 60%.[360] Forgoing open-web advertising would mean forgoing additional advertising sales for those web impressions.

[356] Deposition of Jeremy Helfand (Disney), September 9, 2023, 103:7–104:5 ("Q. You also mentioned there's differences in the experiences for consumers between display advertising and video advertising. Can you explain what you mean there? A. I mean just in terms of how the -- the advertisement is integrated into the content experience. Display is normally sitting adjacent to content, whether it's, you know, on the page, or in an article, something like that. For video, the vast majority of our video is instream, meaning it's interspersed throughout the content… Q. Are these differences between display and video advertising unique to Disney? A. No. Q. Is it common within the industry to delineate between display and video advertising? A. Yes.").

[357] [redacted]

[358] "Display" includes outstream videos and videos with unknown instream/outstream status. These figures reflect average payments collected by bidding tools from advertisers and are calculated using RFP 7 Google Ads and DV360 and RFP 54 Google Ads data. I exclude advertisers from China and countries and regions where Google is prohibited from operating due to US sanctions and limit to indirect transactions for web or unknown channel impressions.

[359] *See* Section II.A.2, IV.B.1.a, IV.B.2.b.

[360] Google XPP-D data (DOJ RFP 7).

(276) **Native.** Web publishers could also in theory use some forms of native advertising, in particular content recommendation ads, to monetize their content. These ads are characterized as having different look and feel, and are meant to "blend into" publishers' content.[361]

(277) In practice, publishers often use display and content recommendation ads together, deploying them in different parts of their webpages. For example, partly due to quality issues and the provision of "clickbait ads," publishers often use content recommendation ads at the bottom of articles, and not at the top of pages: as a 2017 Google document noted, "Because the minimum quality bar is set somewhere around "it makes me sick to my stomach" (real publisher quote), publishers typically relegate [content recommendation] ad units to the bottoms of articles."[362] Similarly, in-feed native ads are distinct from display ads because they occupy slots *within* (as opposed to above and around) publishers' content.[363]

(278) Further highlighting the distinction between display and content recommendation ads, Google offered a separate type of advertising unit within AdSense called Multiplex ads (formerly called Matched Content)[364] that it lists as distinct from display and describes as a "grid-based ad unit that shows content recommendation-style native ads."[365] Figure 10 in Section II.A shows an example of Google's

[361] GOOG-AT-MDL-000994606, at -679 (11/05/2020) (A Google presentation on "Ad Formats and Competition" notes that native ad units "are not recommended outside of main content" where banner ads would typically be placed: "If you're considering Native Ads outside of main content: native ads don't perform as well here because they're meant to blend into content, not be outside of it"). *See also* GOOG-DOJ-13606751, at -761–763, (01/15/2015) (Notes that display ads "takes the user out of context (interrupt based)" as opposed to content recommendation ads); GOOG-AT-MDL-014374858, at -930 (n.d.) ("Given the nature of its platform, FB and IG [Instagram] offer native ads that do not meaningfully disrupt the user experience, allowing aggressive ad load management"); GOOG-AT-MDL-000994606, at -679 (11/05/2020) ("We strongly encourage publisher to use our templates as a starting and to involve their design and engineering teams in the process… When a native ad is in a feed it should very closely match your site/apps layout. Plan on starting with a pre-made template but making significant edits to the CSS for layout, font, and styling."); GOOG-AT-MDL-008909788, at -872 (05/17/2018) ("In a meaningful way, native ads shift the burden of design from advertisers to publishers.").

[362] GOOG-AT-MDL-003644990, at -995 (05/23/2017) ("Over the past several years the web has seen a proliferation of content recommendation ad units from three main companies: Taboola, Outbrain, and RevContent (TBOBRC)… These companies have grown enormously by peddling clickbait ads (sometimes scams and often NSFW) that generate high CTRs and CPMs for publishers… Because the minimum quality bar is set somewhere around "it makes me sick to my stomach" (real publisher quote), publishers typically relegate [content recommendation] ad units to the bottoms of articles. However the same publishers describe the revenue (often in the form of a guaranteed CPM) as 'like crack' which is why so few have chosen to abandon these ad units."). *See also* GOOG-TEX-00800853, at -858 (04/2017) ("'The problem I find with Taboola and Outbrain is that they bring really, really junk results... so you can write about technology but you get ads for celebrities and, you know... it's really junk, I really hate it'") and at -862 ("'I tried Taboola… I removed it because it was all this junk content. I didn't like it... but I was making some extra money'").

[363] *See* Section II.A.

[364] *See* GOOG-AT-MDL-0022638681, at -682 (01/14/2019) (Google proposal "Matched Content in AdSense (2019 strategy proposal)": "Matched Content launched in AdSense mid-2015 in response to growing content recommendation networks such as Taboola (TB) and OutBrain (OB).").

[365] Google, "About ad units," Google AdSense Help, https://support.google.com/adsense/answer/9183549. *See also* GOOG-AT-MDL-003644990, at -997 (05/23/2017) (A Google document titled "Content Recommendations (CoRe) in DRX – PRD" reads"AdSense has built a [Content Recommendation] product (publicly called 'Matched Content') that competes head to head with TBOBRC [Taboola, Outbrain, and RevContent]") and GOOG-AT-MDL-003644990, at -990 (05/23/2017) ("An all-ads version of this has been built, and dubbed Multiplex"). Per Google, "Traffic Multiplex ads (retired)," Google Ad Manager Help, https://support.google.com/admanager/answer/9428537?hl=en, (Multiplex was

Multiplex product. Google documents identify Outbrain, Taboola, and Revcontent—firms without substantial business in open-web display advertising—as the main competitors for this content recommendation product.[366] Google presentations also present market shares and compares features among this set of competitors.[367] Google documents indicate that it recognized that publishers view its Multiplex ads product as a closer substitute to other content recommendation products than to display products.[368]

IV.B.1.b. Open-web publishers cannot easily substitute to selling display advertising inventory with their own integrated advertising tools

(279) Open-web publishers rely on third-party ad tech products to sell their ad inventory. Other publishers, including Facebook, Twitter and Amazon, use their own integrated ad tech products to sell ads.[369] Publishers with more specific advertising requirements, such as social media websites selling in-feed ads, or publishers desiring more control over user data shared with third parties, may find benefits from developing their own integrated ad tech products.[370]

retired in July 2023).

366 *See* GOOG-DOJ-05285783, at -792 (06/2017); *see also* GOOG-AT-MDL-019001843, at -845, -853–857, and -888–889 (08/10/2016); *see also* GOOG-AT-MDL-003644990, at -995 (05/23/2017).

367 *See* GOOG-AT-MDL-019001843, at -853–857 (08/10/2016); *see also* GOOG-AT-MDL-019427179, at -181 (02/2018).

368 *See, e.g.*, GOOG-DOJ-12449378, at -397 (08/10/2016) ("For matched content, we have some partners who compete us with Taboola/Outbrain in DFP. And they might not continue to use matched content if they were forced to HC [hard-code] one [.] i.e. they'd just hard-code Taboola / Outbrain.").

369 Before Facebook exited open-web display with its Facebook Audience Network product, in a 2018 presentation it noted, "Supply-acquisition is highly dependent on the ad tech that a publisher uses. All publishers use ad tech (ad server mediation platform/supply-side platform) to facilitate transactions between demand sources (like AN) and their available ad impressions. Publishers either build their own ad tech (Twitter, Rovio, Snap) or use 3rd party vendors like Google DFP, Google AdMob and MoPub. By revenue, we estimate that [redacted] of our addressable market flows through 3rd party vendors and [redacted] flows through home grown solutions[.]" FBDOJ003260796, at -799 (02/05/2018).

370 *See, e.g.*, Deposition of Tobias Maurer (Google), Nov. 9, 2020, 128:10–129:4 ("Q. I'm sorry, let me back up. Thank you for clarifying that. Before interfacing with Google's demand product – or, I guess, let me just back up and have you explain for me, why, for example, for eBay, was eBay a good candidate for the demand product? A. They -- they're very unique in that they're not primarily -- you know, advertising revenue is only one thing that they care about. They also obviously care about selling products on eBay as a platform. So their challenge is to understand what is the opportunity cost of showing an ad as opposed to getting someone to buy a pair of shoes or, you know, something like that. And that's something really only they can determine. So traditional ad servers didn't really serve them well in doing that. And also they had, you know, the expertise to develop different technology in-house, so that's why we started talking to them."); *see also* Deposition of Tim Craycroft (Google), Aug. 15, 2023, 100:3–100:23 ("Q. And then you said you didn't want to send Amazon's data to Google, even if it was encrypted, right? A. Yep. Q. Is that because Amazon didn't trust Google at that time? A. It's nothing to do with Google specifically. We had the same conversations with every partner in the ad tech space. It's about Amazon's relationship with its own customers and maintaining trust. Q. Who else did you discuss this with? Like what other companies? A. Every SSP in the space that we would buy ads on, making sure that they weren't attempting to learn – hey you're serving a lot of, you know, expensive handbags to this one user on my ad exchange, so now I can learn something about them and sell that learning to someone else. We did a lot technically and with contractual protections to prevent things like that.").

(280) As an example, Disney uses DFP for all of its display advertising,[371] but Disney also has developed its own in-house ad server, Disney Ad Server, with more "robust" large-scale video streaming capabilities than are available in DFP.[372]

(281) For many open-web publishers, however, developing and switching to integrated ad tech products would be costly and time consuming, require overcoming indirect network effects in order to attract advertiser spending, and would limit access to the large amount of advertiser demand that flows through third-party ad tech products.[373] I discuss the significant costs that publishers face in self-supply of their own ad tech products in more detail in Section V.B.2.b.

IV.B.2. Open-web display advertising is an important component of marketing for advertisers, and distinct from other forms of advertising

(282) As consumers have shifted spend and activity from traditional to digital media, advertisers have also shifted spend towards digital advertising and away from non-digital, or offline, forms of advertising such as print, television, and radio.[374]

(283) Digital advertising offers distinct benefits over offline advertising. Digital advertising can be used to engage immediately with consumers, for example by allowing consumers to immediately click on an ad and be directed to the advertiser's website.[375] Digital advertising also allows for more targeted ads than offline advertisements,[376] and can use data gathered from users' browsing history to improve

[371] Deposition of Jeremy Helfand (Disney), September 29, 2023 132:3–132:13 ("Q. And just so I'm clear, does Disney still use Google's DFP ad server to sell video advertising outside of Hulu and Disney+? A. The Google Ad Manager, previously DFP, is used to deliver video advertising on some of our properties like ESPN. Q. And Disney uses Google Ad Manager, previously known as DFP, to sell all of its display advertising; is that right? A. That is correct.").

[372] Deposition of Jeremy Helfand (Disney), September 29, 2023 132:14-133:4 ("Q. You talked a little bit about why Google, or sorry, Disney developed an in-ad server. How does Disney's ad server compare to Google's ad server? A. In comparison, what I would say is that the Disney Ad Server was built from the ground up for video. And some of the important capabilities associated with being able to deliver large scale video is inherent in the Disney Ad Server, especially for streaming. The Google ad server or Google Ad Manager started as a display ad server and has evolved to support video. And there are certain, I would say, video capabilities that are not as robust as what we developed for the Disney Ad Server.").

[373] *See* Deposition of James Glogovsky (New York Times), Aug. 25. 2023, 149:11–150:8 ("Q. What disadvantages, if any, are there to The New York Times using a publisher ad server for display that it has built and operated itself?… A. Maintaining ad technology that is homegrown, built internally, whether that be an ad server, has several disadvantages. One, the operational support and infrastructure in capital resources required to maintain that and to evolve with the industry changes would require us to invest a significant portion. And then also just staying up to date with the evolving landscape of the ad formats and being able to adapt to our clients' needs readily and availably, or quickly.").

[374] GOOG-DOJ-03242646, at -657 (09/26/2018) (Google "Programmatic Overview" deck).

[375] MSFT-LIT-0000046646, at -661 (10/10/2017) (AppNexus Response to FCA's RFI notes that unique characteristics of online advertising, which make offline advertising a weak substitute, include that "[o]nline advertising is uniquely well-suited to directing potential customers to advertisers' websites" and "[o]nline ads … offer the opportunity for immediate engagement with the advertisers' brand through links or other interactive experiences.").

[376] *See, e.g.*, MSFT-LIT-0000046646, at -660 (AppNexus Response to FCA's RFI notes that "Online advertising allows for much more specific audience targeting, in some cases enabling advertisers to reach specific potential customers. Targeting for offline ads, on the other hand, is far less exact."; *see also* Google, "What's online marketing?," https://support.google.com/google-ads/answer/6227161?sjid=7802735466321330464-NA ("There's a lot that's different

such targeting.[377] Additionally, digital advertising enables advertisers to more accurately track and quickly respond to the effectiveness of their ads.[378] Even though many advertisers may still use both digital and offline advertising in their ad campaigns, they may also have complementary features from the perspective of advertisers.[379]

(284) Below, I discuss evidence that within digital advertising, display advertising on websites provides distinct value to advertisers as compared to other forms of digital advertising; and that for advertisers, open-web display advertising is distinct from display advertising on web sites of publishers that rely on their own integrated ad-tech products for the sale of display inventory.

IV.B.2.a. Display advertising on websites is distinct from other forms of digital advertising for advertisers

(285) Many advertisers use multiple forms of digital advertising. Marketing research and documents and testimony from industry participants acknowledge that different forms of advertising can target users at different stages of what is referred to as the "marketing funnel" (or, equivalently "sales funnel").[380] Moreover, because different forms of digital advertising may reach different sets of consumers, using multiple forms of digital advertising allows an advertiser to broaden the reach of a campaign.[381]

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about online advertising compared to traditional advertising like newspapers, TV ads, or billboards. … Online advertising lets you target your ads to the type of customers you want, and filter out those you don't."). *See also* Deposition of Kendall Oliphant (United States Census Bureau), Aug. 9, 2023, 214:17–217:15 ("A. Digital allowed you to be a little bit more precise in your targeting, and that precision was necessary as we got into the later stages of the campaign. Even if the cost had been higher, the ability to be so precise, so strategic, and to be able to adapt as quickly as we could, it would have made it worth it for this effort.").

377 MSFT-LIT-0000046646, at -663 (10/10/2017) (AppNexus Response to FCA's RFI). *See also* Google, "What's online marketing?," https://support.google.com/google-ads/answer/6227161?sjid=7802735466321330464-NA ("you can use different targeting methods to reach potential customers right when they're searching for your products or services. This can help make sure you're putting your advertising dollars towards reaching only the people most likely to become your customers.").

378 Google, "What's online marketing?," https://support.google.com/google-ads/answer/6227161?sjid=7802735466321330464-NA; Avi Goldfarb, "What is Different about Online Advertising?", *Review of Industrial Organization* 44, no. 2 (2014), 120.

379 For example, AppNexus' response to FCA's request for information in 2017 states that "[o]nline and offline advertising, while complementary, are not substitutes," lists several features that differentiate online from offline advertising, and notes that "[f]rom an advertisers' perspective, offline advertising will not be substitutable for online advertising until offline ads can reasonably replicate these characteristics." MSFT-LIT-0000046646, at -660–662 (10/10/2017) (AppNexus Response to FCA's RFI); *see also* Deposition of Kristy Kozlowski (Comcast), Sep. 6, 2023, 54:12–55:9 ("Q. And I know you mentioned that Mr. Jenckes is on the sell side. But from your buy side perspective, how does the statement that the marketplace is highly competitive compare to Comcast's view on competition in the purchase of advertising?. . . I -- from my perspective as a buyer of media here for Comcast, I think that each media channel, whether it be broadcast, digital, out of home, radio, all plays a slightly different role in our media mix and our ability to deliver sales. They all sort of operate independently, yet synergistically help drive volume to our sales channels and work, you know, together in many ways but might be executed differently. But it really comes down to our ability to deliver our sales goals and what the right mix is and how efficiently we can do that.").

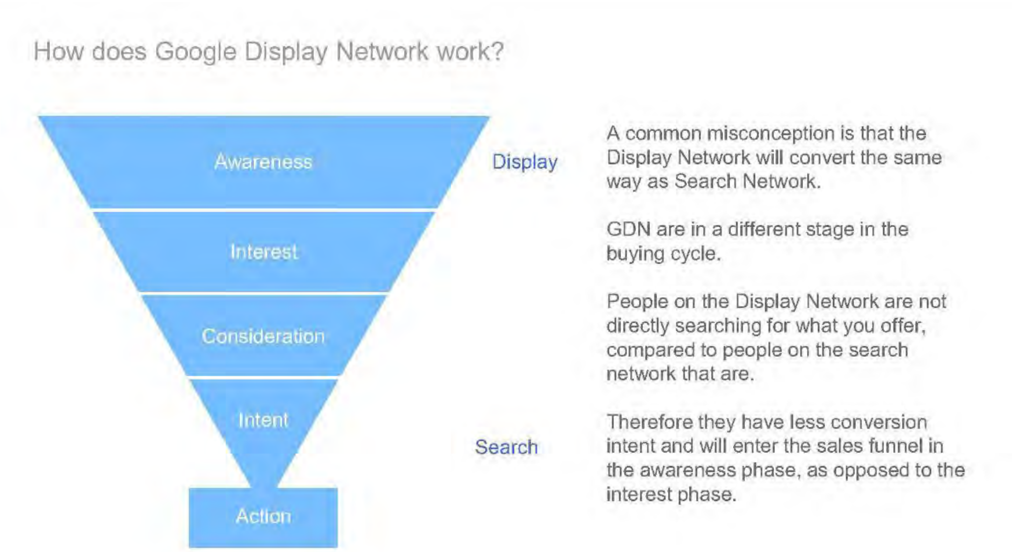
380 *See* Section II.A.2.

381 Advertisers say "diversification [across advertising types] is perceived as essential" and advertisers "won't completely turn a channel off as they want to diversity as much as possible" because they "perceive a diminishing returns if they focus on only a few channels." GOOG-DOJ-AT-0070932, at -947 (03/2020) (A Google "Discovery Campaigns Social

(286) Below, I describe relevant distinctions between web display and other forms of digital advertising for advertisers.

(287) **Search.** Google documents indicate that web display and search ads are viewed as reaching potential customers at different stages of the marketing funnel.[382] For example, Figure 28 is a slide from a 2018 Google presentation that notes display advertising (through GDN) operates at an earlier stage of the "sales funnel" than search ads.

Figure 28. Distinction between Display and Search advertising in the marketing funnel



Source: GOOG-DOJ-AT-00221276, at 282 (2018).

Buyer Insights" deck).

Note also that certain types of advertisers may prefer types of advertising that better target their ideal audience. For example, a gaming company may prefer to advertise on video games because it better targets the relevant audience. Deposition of Henry Crum (Meta), Apr. 22, 2022 130:17–131:4 ("So, yeah. When I say a category or a vertical, what I mean is e-commerce, gaming. So just different -- just different kinds of advertisers. Services. Local retail, you know. So all of these advertisers are trying to achieve growth through our ads. And so some of those would work well in our publisher ecosystem and some of those wouldn't. And I was just giving an example saying gaming app ads work really well in gaming publishers because you're playing a game and then you see an ad to go and install another awesome game. So that's just a slam dunk.").

[382] GOOG-DOJ-AT-02003161, at -168 (03/2021) (Google "Super basic ads overview" deck); GOOG-DOJ-AT-00221276, at -282 (2018) (Google "Google Display Network (GDN) 101" deck). *See also* Deposition of Tim Craycroft (Google), Aug. 15, 2023, 99:1–99:21. ("A. Sure. Oversimplified, but if you go to college and take a marketing class, they're going to tell you the funnel is awareness, consideration, and purchase or conversion. Awareness is becoming aware that a brand or product exists. A lot of the automotive ads you'll see watching NFL are letting you know a cool car is available, and it will be full of lifestyle imagery. You're going to be super cool yourself, if you buy this car. Consideration is then getting you to go engage with content, showing that you're starting to express interest in a product or brand. That could be getting you to go do a vehicle configuration on an automotive manufacturer's website. Then, of course, conversion, in that case, is getting you to come into the dealership, you know, for -- an e-commerce retailer conversion's getting you to buy on the website. And different ad products are optimized for different parts of the funnel.").

(288) Similarly, other Google documents also note that display advertisements are useful for building awareness and capturing users' attention early in the buying cycle, in contrast to search advertisements, which are useful for driving sales among users who are already searching for a specific product.[383] Also, while search advertisements allow advertisers to target users based on their search queries, display advertising tends to target users based on other characteristics, such as demographics and browsing history.[384]

(289) Because they play different roles, display and search advertising are often used jointly by advertisers. According to a Google presentation, in 2021, advertisers who used both search and display together accounted for nearly 60% of Google Display Ads revenue.[385] The presentation noted that these advertisers use search and display advertising for different reasons;[386] for example, advertisers stated, "Search answers demand whereas Display generates demand."[387]

(290) **Instream video**. While in this report I include outstream video ads within web display advertising, instream video ads are outside of this category. Instream and outstream video ads help advertisers meet different goals. Instream video advertisements tend to have a higher view rate and reach a more attentive audience since they are shown to users when they are already watching a video, while outstream video advertisements tend to reach a broader, but less engaged, audience since users can easily scroll past them or direct their attention elsewhere on the page.[388] Google recommends that advertisers use instream video ads "when you have video content you'd like to promote before, during, or after other videos" while outstream ads are preferable for advertisers who "want to expand the reach of your video ads … helping you reach more customers."[389]

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383 GOOG-DOJ-AT-00039022, at -052 (06/05/2020) (Google Discovery ads strategy deck) (Display ads help advertisers "[d]rive performance across publisher sites," while search ads "[c]apture a person's declared intent."); Google, "About Display ads and the Google Display Network," https://support.google.com/google-ads/answer/2404190; MSFT-LIT-0000046646, at -661 (10/10/2017) (AppNexus Response to FCA's RFI).

384 *See also* MSFT-LIT-0000046646, at -661 (10/10/2017) (AppNexus Response to FCA's RFI).

385 GOOG-DOJ-AT-00330626, at -650 (02/2021) (Google Display Advertisers 101 deck states, "GDA revenue comes primarily from advertisers who are also on Search").

386 According to a Google presentation, one reason "why advertisers say they use display" is because "the benefits of their products or services are better communicated with imagery than text, affinity audiences help find demand among those who wouldn't know to search, [and] display is ideal for products with lengthy conversion funnels." (GOOG-DOJ-AT-00330626, at -664 (02/2021) (Google Display Advertisers 101 deck)). On its Google Ads Help page, Google notes that search campaigns are "great for driving sales, leads, or traffic to your website" while display campaigns are a "great way to expand your reach and stay top of mind with an audience beyond just Google Search." (Google, "Choose the right campaign type," https://support.google.com/google-ads/answer/2567043?sjid=7802735466321330464-NA).

387 GOOG-DOJ-AT-00330626, at -663 (02/2021) (Google Display Advertisers 101 deck).

388 Google, "'In-stream ad' or 'In-display ad'", https://support.google.com/google-ads/thread/1468899/in-stream-ad-or-in-display-ad; GOOG-AT-MDL-000034633, at -634 (08/24/2020) (Email correspondence between Google employees, 2020, "instream (similar to youtube watch page) slot have high view rate, while outstream have lower view rate."); KARGO_000063, at -69 (Study finding that "in-stream ads received the lowest biometric response" among ads tested, indicating a better user experience).

389 Google, "About video ad formats," Google Ads Help, accessed December 19, 2023, https://support.google.com/google-ads/answer/2375464?hl=en.

(291) Instream video advertising also serves a distinct purpose for advertisers relative to web display ads.[390] Instream video ads tend to be more expensive to produce than static display advertisements, and because some ad networks and exchanges specialize in either instream video or static display ads, advertisers may need to use different channels to purchase video and display advertisements.[391]

(292) **Native advertising.** Native advertising is also distinct from web display advertising from an advertiser's perspective.[392] Whereas traditional banner display ads are distinguishable from a publisher's content, native ads are styled to blend into the format of a publisher's site.[393]

(293) Native and display ads also differ in part due to constraints placed on ad formats. Native advertising inventory generally has inflexible sizes, formats, and page placement. Moreover, since native advertising is designed to blend in with organic site content, publishers may have strong brand safety standards and creative standards for native ads.[394]

(294) In Section II.A, I described three prominent forms of native ads: sponsored listing, social, and content recommendation. There is evidence that each form is distinct from display advertising from an advertiser's perspective.

- Sponsored listing ads are typically shown on a retailer's site, or on search or product listing pages, limiting the set of advertisers and publishers for whom such ads are appropriate.[395] Display ads do not face the same restrictions.
- Social in-feed ads are shown on social media websites. An executive from GroupM, a media agency, noted that social media and display advertising are complements for advertisers and that

[390] *See* Section II.A for a discussion of the differences between instream and outstream video ads. There, I note I follow industry convention and include outstream video ads within display ads. I also include transactions involving outstream video ads in my calculation of market shares.

[391] MSFT-LIT-0000046646, at -665–666 (10/10/2017) (AppNexus Response to FCA's RFI, Oct. 2017); Deposition of Jeremy Helfand (Disney), September 29, 2023, 101:12–101:23 ("Q. And why within Disney's business do you delineate between display and video formats? A. The -- they tend to be very different markets. So, you know, in terms of how they're priced and the -- who are the buyers of those, so -- and in terms of the experiences that we are developing for our consumers. And so it's helpful to understand what type of, you know, format you're referring to when talking about the advertising that happens across the -- our various properties. Although again, you know, the vast majority of where we focus is on video.").

[392] Erin Hynes, "Native Ads vs. Display Ads and when to use each," StackAdapt, May 5, 2022, https://blog.stackadapt.com/role-of-native-advertising-vs-display; Laura Kloot, "Native Ads vs. Display Ads: What are the differences?" Outbrain, accessed December 19, 2023, https://www.outbrain.com/blog/native-ads-vs-display-ads/.

[393] Google, "About native ads," Google Ad Manager Help, accessed December 19, 2023, https://support.google.com/admanager/answer/6366845.

[394] Deposition of James Glogovsky (New York Times), Aug. 25, 2023, 263:4–263:19 ("Q. Did The New York Times consider adopting some types of native ads that it ultimately did not implement?... A. We have largely been focused on populating the current available ad spots within our content with display ads and native ads that met our esthetic requirements, but we have not considered native ads in which it looks too much like content. Q. Why is that? A. It is our goal to have a natural understanding for the readers of where editorial starts and ends and not to be confused with advertising.").

[395] GOOG-AT-MDL-003299671, at -673 (06/24/2021).

using both forms of advertising allows advertisers to extend their audience.[396] Similarly, an executive from Comcast, an advertiser, testified that growth in social media spending has not displaced display spending.[397] A Facebook executive testified that Facebook struggled to convert its social media advertisers to open-web display when it attempted to expand into open-web display advertising.[398] Moreover, some advertisers who boycotted Facebook in June 2020 and left Twitter in late-2022 also explicitly stated that they planned to reallocate their spend to other social media sites such as Pinterest, Snapchat, LinkedIn, and Tiktok.[399]

(295) Distinctions between open-web display and social media advertising are also evident in Google's descriptions for its "Discovery Ads" product for ads placed on Google's "O&O feed-like

[396] *See, e.g.,* Deposition of Susan Schiekofer (GroupM), September 26, 2023, 103:25-104:16 ("Q. For advertisers who want to have a broad reach, do you view social and display bought through an exchange as complements or substitutes?...THE WITNESS: Complements...Q. Okay. And just briefly, again, what's the reason for why?...THE WITNESS: It extends the audience, right? There's the social -- heavy social users, and then they can go on a website and see a reinforcement of the message. Or they're not on social and you want to get them on display.").

[397] Deposition of Kristy Kozlowski (Comcast), September 6, 2023, 36:19–37:6 ("Q. Okay. Can you explain the ways that the importance of social has changed for Comcast since 2018. A. As media consumption has grown and more people spend time on social platforms, it has become a reach vehicle for us to deliver our advertising. The platforms themselves have also changed quite a bit and have truly evolved since 2018, delivering more opportunities for us to deliver our message in either the spoken unique ways or more as a reach play, but it has not displaced display.").

[398] Deposition of Henry Crum (Meta), April 4, 2022, 126:24–128:13 ("Q. And when you say Facebook was a great demand partner, what do you mean by that? A. I think what I just said, which is we were -- we had really strong demand. And what I mean by 'strong demand' is that we -- Audience Network was really successful in gaming and utility apps. We had -- within the app ecosystem we had really figured out how to help publishers monetize their products. So -- and on the web side, we -- as I said, we hadn't figured it out yet. We got into header bidding. We were starting to see that we were having some success. We hadn't managed to have any success before that with the Audience Network web waterfall product. And so I think that, you know, when we -- when I was thinking about partnerships with publisher ad servers, because of how good our -- how strong our business was, the Audience Network business was in-app, kind of in-web, I thought that we would be a really strong partner for any ad server or header bidding wrapper. Q. And why -- why was there this difference between app and web, in your view, in terms of Audience Network's performance? A. I think the primary one was because most of our success in our ads business -- in Meta's -- sorry. Most of the success in Meta's ads business had been on the Instagram app and the Facebook app. And so our ads worked really well inside an app environment where we replicated some of the things that we saw work like the native experience of our ads in Facebook and Instagram inside other apps. And then on the web it was a very different environment that was mainly banners, those annoying banners, and – or the big – the big, I think, 300 by 250s. And the demand, the advertising demand and the creative that we had didn't work as well. We hadn't figured out how to make it work as well inside a web environment as we had an app environment.").

[399] *See, e.g*., Aisha Counts, "X Unlikely to Win Back Advertisers Before Holiday Season", *Bloomberg*, Sep. 14, 2023, https://www.bloomberg.com/news/articles/2023-09-14/x-unlikely-to-win-back-advertisers-before-holiday-season ("None of Tinuiti's [a marketing firm] advertisers plan to buy ads on X during the holidays and instead are increasing spending on Facebook, Instagram, TikTok and even Snapchat. Twitter "was a part of every plan," said Jason Harris, CEO of ad agency Mekanism, which works with clients including Alaska Airlines, Charles Schwab and Dropbox. "Now brands, our clients, are pivoting away from it more towards stable platforms like TikTok or Reels or even YouTube Shorts," he said."); Ryan Mac and Kate Conger, "X May Lose Up to $75 Million in Revenue as More Advertisers Pull Out," *New York Times*, Nov. 24, 2023, available at https://www.nytimes.com/2023/11/24/business/x-elon-musk-advertisers.html ("Leesha Anderson, the vice president of digital marketing and social media at the advertising agency Outcast, said its clients steadily stopped spending on X after Mr. Musk took over and had found alternatives on platforms like LinkedIn and TikTok."); Subrat Patnaik, "Snap Investors Hope for Advertising Windfall as Brands Ditch Musk's Twitter, *Bloomberg*, Dec. 6, 2022, available at https://www.bloomberg.com/news/articles/2022-12-06/snap-snap-bulls-hope-for-advertising-windfall-as-brands-ditch-twitter ("Snap Inc., one of the smaller social media networks, may be among the biggest beneficiaries of Twitter's loss of advertisers. Twitter could lose almost a third of its ad revenue as brands pull back from the site, according to estimates from MKM Partners LLC. Meta Platforms Inc.'s Instagram and Facebook would win the biggest chunk of that business.").

properties."[400] Figure 29 and Figure 30 below are two slides from a June 2020 presentation, noting how Discovery Ads is "positioned against Facebook" (which does not offer open-web display ad tech products),[401] and how social ads target different segments of advertiser spend than its display ad products.[402]

Figure 29. Description of Google's Discovery Ads and its competition

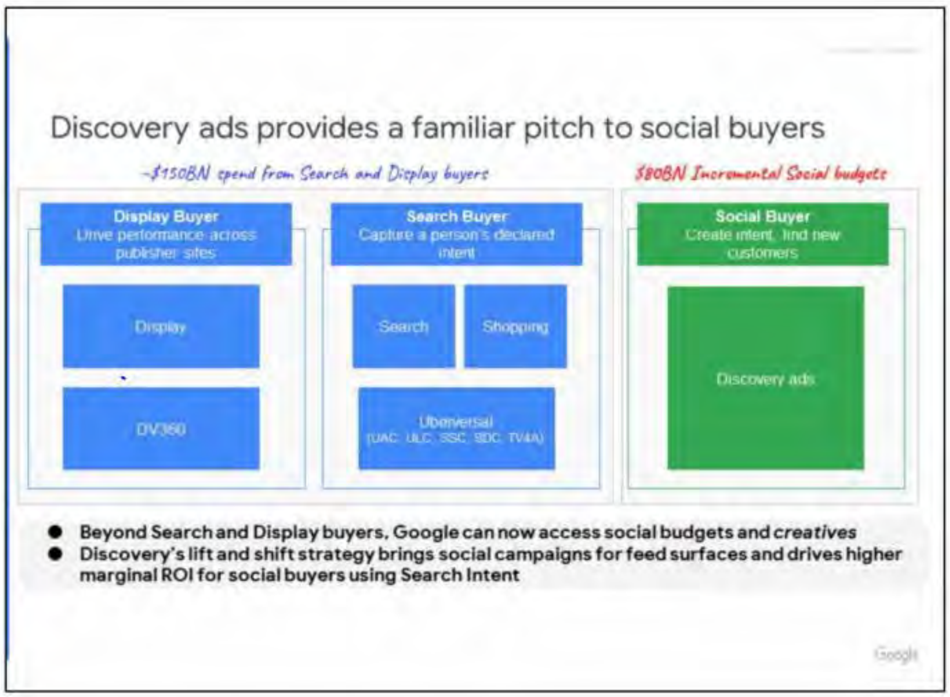
Source: GOOG-AT-MDL-009638243, at -250 (06/05/2020).

400 GOOG-AT-MDL-009638243, at -246 (06/05/2020) ("Discovery ads reach 2.9B people across Discover, YouTube and Gmail worldwide," and "Open beta announced … in May 2019"). Discover is "a part of Google Search that shows people content related to their interests, based on their Web and App Activity." Google, "Discover and your website," Google Search Central, accessed December 19, 2023, https://developers.google.com/search/docs/appearance/google-discover.

401 GOOG-AT-MDL-009638243, at -250–253 (06/05/2020).

402 GOOG-AT-MDL-009638243, at -274 (06/05/2020).

Figure 30. Pitch for Google's Discovery Ads



Source: GOOG-AT-MDL-009638243, at -274 (06/05/2020).

(296) Consistent with the distinctions between Discovery ads and Google's search and display ads illustrated above, Prabhakar Raghavan, Google's Senior Vice President in charge of advertising and commerce products,[403] testified that Google launched Discovery ads because advertisers were asking Google why they could not get the types of social ads from Google that they could get from Facebook and Instagram.[404]

(297) Content recommendation ads are also distinct from display advertising for advertisers, given their format and objective to drive traffic to content.[405] Consistent with content recommendation appealing to different advertising needs and advertisers, a 2020 Google presentation noted that a challenge for its Matched Content product was a "lack of [content recommendation]-specific advertisers."[406] A

[403] Testimony of Prabhakar Raghavan, *United States of America, et. al. vs. Google LLC*, CV No. 20-3010 (D.D.C.), October 26, 2023, at 7290:16-18 (Raghavan is senior vice president for knowledge and information products); at 7293:14-7294:17 (Raghavan is currently responsible for advertising and commerce products as well as others).

[404] Testimony of Prabhakar Raghavan, *United States of America, et. al. vs. Google LLC*, CV No. 20-3010 (D.D.C.), October 27, 2023, at 7539:6-10 ("Q. And Google launched Discovery ads because you found advertisers were asking you why they couldn't get the types of social ads they could get from Facebook and Instagram from Google; right? A. Yes.").

[405] *See, e.g.,* GOOG-AT-MDL-019001843, at -845 (08/10/2016); GOOG-DOJ-13606751, at -762–763 (01/15/2015); MMA Mobile Native Advertising Committee, "The Mobile Native Ad Formats," *Mobile Marketing Association*, https://www.mmaglobal.com/files/documents/the_mobile_native_formats_final.pdf.

[406] GOOG-AT-MDL-003973366, at -407 (01/2020).

2018 Google deep dive on content recommendation noted that the advertiser use case is "with a goal of getting engagement on their content" and that downstream conversions were "secondary."[407]

(298) To summarize, the various types of digital advertising discussed above have important differences for advertisers. In addition to reach and targeting differences discussed above, forms of advertising can be differentiated by their "cost model"—that is, whether advertisers are charged and publishers are paid out on a per-click (CPC), per impression (CPM) or per view (CPV) basis.[408] I discuss these distinctions in more detail in Section IV.E below.

IV.B.2.b. Open-web advertising is distinct from advertising on applications or on websites using integrated advertising tools

(299) As I explained in Section II.A.1, open-web advertising consists of advertising on web publishers that use non-integrated ad tech products to sell their online display inventory. From the perspective of advertisers, such advertising is distinct from advertising on applications, or on websites for publishers (such as Amazon and large social media companies including Facebook and Twitter) that sell their owned-and-operated online display inventory using integrated, proprietary ad tech products. This is for several reasons.

(300) First, open-web advertising provides advertisers with the ability to reach more users, more frequently, than restricting advertising to applications or websites with integrated advertising sales.[409] According to a 2020 survey, consumers spend nearly two-thirds of their online time on properties not owned by major technology companies (such as Facebook, Instagram, Amazon, etc. that use their own

[407] GOOG-AT-MDL-019427179, at -194 (02/2018).

[408] *See* Figure 79 in Appendix C, which summarizes the differences in ad format, cost model, and targeting capabilities between digital advertising types.

[409] *See, e.g.,* Deposition of Susan Schiekofer (GroupM), September 26, 2023, 103:25–104:16 ("Q. –let me ask: For advertisers who want to have a broad reach, do you view social and display bought through an exchange as complements or substitutes? … [A.] Complements Q. Okay. And just briefly, again, what's the reason for why?...[A.] It extends the audience, right? There's the social – heavy social users, and then they can go on a website and see a reinforcement of the message. Or they're not on social and you want to get them on display."). *See also* Figure 42 below in Section V.B.2.a.

integrated ad technology).[410] Limiting advertising to only websites and apps with their own integrated advertising sales limits advertisers' reach from a large portion of online web inventory.[411]

(301) Second, open-web display advertising and advertising on applications or publishers with their own integrated ad tech tools can reach different groups of consumers, or reach similar groups of consumers at different times. Consistent with this, many advertisers advertise on both open-web publishers and on online properties with integrated advertising sales. According to a 2021 Google Display Advertisers deck, "[a]lmost all Display advertisers use Facebook and Instagram ads to promote the same products they advertise using GDA [Google Display Ads]," with over 80% of advertisers said they promote the same products with both GDA and Facebook, and nearly 60% of advertisers said they promote the same products with both GDA and Instagram.[412] Additionally, in-app advertisements may be seen primarily by smartphone users, who have different characteristics than web users that are reached by web-display advertising.[413]

(302) Third, whereas advertising on websites with integrated ad-tech products show advertisements to users while they are within the publisher's web properties, open-web advertising tools can track and display advertisements to users on a broader set of websites as they navigate the web. This capability allows advertisers to reach users when they are conducting a web search for a product or considering a purchase decision on different websites.[414]

(303) Last, although advertising on a website with integrated advertising tools may offer advertisers access to additional inventory not available on open-web publishers, advertising through integrated

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[410] A 2020 survey conducted by The Harris Poll on behalf of OpenX, from a sample of 2,000 users in the United States defined open web as "any property, website or app that is not owned by a major technology company (Facebook/Instagram, Amazon, Youtube). Examples of 'the open web' include sites and apps like The New York Times, CNN, BuzzFeed, ESPN, Weather.com, All-recipes.com, as well as apps like Words With Friends, Angry Birds or Weatherbug." The survey also noted that consumers stated that they are more likely to find relevant and impactful advertisements on the open web than on Facebook, Instagram, or Amazon. OpenX, "The Open Web vs. the Walled Gardens: Consumer Preferences & The Opportunity for Brand Marketers," OpenX, https://s3.amazonaws.com/media.mediapost.com/uploads/OpenWebVsWalledGardens.pdf; *See also* OpenX, "Walled Gardens VS. Open Web Research Report 2020," https://www.openx.com/thought-leadership/walled-gardens-vs-open-web-research-report-2020/, which found that "84% of consumers turn to the Open Web first for information on a business."

[411] *See* Figure 42 in Section V.B.2.a regarding the size of "addressable" and "unaddressable" ad inventory.

[412] GOOG-DOJ-AT-00330626, at -666 (01/02021) (Google Display Advertisers 101 deck).

[413] IAB Europe, "IAB Europe's Guide to In-App Advertising," IAB Europe, February 2022,, https://iabeurope.eu/wp-content/uploads/2022/02/IAB-Europe-Guide-to-In-app-advertising.pptx.pdf ("As [the audience for in-app advertising] is highly comprised of heavy smartphone users they tend to trend younger and more affluent than traditional web users").

[414] MSFT-LIT-0000046646, at -662 (10/10/2017) (AppNexus Response to FCA's RFI states, "The disadvantage of social media advertising is its limited reach. Today, social media ads generally appear only on social media sites and apps. As a result, advertisers buying social media ads may not be able to target users at the most ideal time, i.e., when those users are navigating the web for a product or considering a purchase decision. In contrast, other forms of display advertising can `follow' users around the web and display the right ads at the most opportune time."); Google, "About Display ads and the Google Display Network," Google Ads Help, https://support.google.com/google-ads/answer/2404190 (GDN "Display campaigns can reach people worldwide across 35 million websites and apps").

platforms often requires the advertiser to use the website's own ad tech tools,[415] and to manage their budgets across different integrated and non-integrated ad tech products independently.[416] In contrast, open-web advertising allows advertisers to coordinate spending and budgeting across many open-web publishers through bidding tools such as ad networks and DSPs.

IV.B.3. Industry participants recognize the distinctiveness of open-web display advertising

(304) Evidence from Google and other industry participants acknowledge important distinctions between open-web display advertising and other forms of digital advertising that limit their substitutability from publishers' and advertisers' perspectives.

(305) Consistent with the distinctions described above, Google's documents indicate the distinctiveness of open-web display advertising relative to other forms of digital advertising. For example:

- Google documents make a distinction between web display and other forms of digital advertising. For example, in a set of sell-side "talking points," Google listed "Web, App, Instream Video and Search" as the "4 tranches of inventory that we seek to acquire and manage," and noted that "[t]hese tranches of inventory have different industry and competitive dynamics, different types of partners with different business models and different technology challenges."[417] An October 2019 "Product and Business Strategy" Google document presents market dynamics, product strategy, and value proposition for Google's web display business, and indicates that similar documents exist for app and video.[418] Additionally, Google's Business Forecast Meeting ("BFM") metrics for 2019 distinguish between web, app, and video instream, where the web is described as "established" while apps and instream video are described as "emerging."[419]
- Google documents analyze revenue separately for display, search, and video advertising.[420] For example, a Google Display Advertisers deck from 2021 presents 2020 Google Ads revenue and growth by campaign channel-type.[421] In a 2018 "Sellside Monetization and Search Distribution QBR" deck, Google lists sell-side revenues separately for display and search, with display

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[415] GOOG-DOJ-03247447, (08/22/2019) (Google DVA Strategy Session deck) at -450.

[416] GOOG-DOJ-03247447, (08/22/2019) (Google DVA Strategy Session deck) at -457.

[417] GOOG-DOJ-03637251, at -251 (05/13/2019).

[418] GOOG-DOJ-09183023, at -023 (10/2019) (Google white paper, "Web – 2020 Product and Business Strategy").

[419] GOOG-DOJ-03242020, at -027 (02/11/2019) (Google DVAA BFM Metrics deck).

[420] *See, e.g.*, GOOG-DOJ-09183023, at -026 (10/2019) (Google Web Product and Business Strategy white paper). (reporting "Google Non-Search Revenue by Product Type" as "Web Video," "App Video," "Web Display," and "App Display."). GOOG-DOJ-03597654, at -664 (2019); GOOG-DOJ-03597207, at -217 (2019); GOOG-DOJ-03596728, at -738 (2019); GOOG-DOJ-03596195, at -205 (2018); GOOG-DOJ-04451152, at -162 (2018); GOOG-DOJ-03595730, at -740 (2018); GOOG-AT-MDL-000965395, at -407 (2018); GOOG-AT-MDL-000963980, at -992 (2017); GOOG-DOJ-AT-02645487, at -506 (2017); GOOG-AT-MDL-001935194, at -212 (2017); GOOG-AT-MDL-00959038, at -055 (2017).

[421] GOOG-DOJ-AT-00330626, at -639–640 (02/2021) (Google Display Advertisers 101 deck).

revenues further divided into web, app, and instream video.[422] It notes that "[w]eb is around ~50% of the overall business, growing at 10% y/y."[423]

- Google sets different Open Bidding fees for web display advertisements and video and app inventory. Fees are set at "95:5 to the publisher for web Display inventory and 90:10 for Video and App inventory."[424]
- Google's documents further differentiate between outstream and instream video. For example, a 2018 deck divides platform & revenue data into Web, Apps, Search, and Instream Video. It notes that "Web" and "Apps" include both display ads and outstream video ads, but "Instream video" is separated out because it is also delivered on other platforms and the "product stack & competition differs."[425]

(306) Other industry participants and observers also make distinctions between display and other forms of digital advertising:

- Documents and deposition testimony from Facebook and its parent company, Meta, clearly distinguish display and social-media advertising:
  - [redacted]
  - Multiple Facebook documents show that Facebook considered its social-media ad inventory as distinct from display advertising and that it did not effectively compete against tools that sold display advertising inventory.[428]

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[422] GOOG-DOJ-04442323, at -328 (2019) (Google Sellside Monetization and Search Distribution QBR deck, 2018). *See also* GOOG-DOJ-AT-01592535, at -542 and -548–549 (12/20/2019) (Google presentation, "Welcome to the Sell-Side World!") which distinguishes between search, display, and video within its sell-side business ("related to publishers i.e. those who provide inventory spaces for ads (and receive compensation for doing so), as opposed to the advertisers who pay to put ads in those spaces"); the document defines Search within the sell-side business to contain AdSense for Search (AFS) which "is a program whereby Google places ads on the results pages of search engines (including but not limited to Google search results" and AdSense for Domains (AFD) which "allows publishers with undeveloped domains to help users by providing relevant information including ads, links and search results."

[423] GOOG-DOJ-04442323, at -328 (2018) (Google Sellside Monetization and Search Distribution QBR deck).

[424] GOOG-DOJ-AT-01826536, at -537 (05/05/2020) (Google internal communication).

[425] GOOG-DOJ-03913653, at -654 (03/26/2018) (Google Sellside Share of Wallet deck).

[426] FBDOJ003286815, at -829–830 (02/28/2018).

[427] FBDOJ003286815, at -823 (02/28/2018).

[428] A 2020 Facebook document regarding key business priorities noted that advertisers have specific non-social programmatic advertising budgets that Facebook's O&O social advertising platform does not have access to FBDOJGOOG_00884328-329, at -329 (06/12/2020) ("We estimate that by 2023, $30-35B of advertiser budgets will be specifically dedicated to non-social programmatic spend, and hence inaccessible to Facebook's O&O advertising."). A 2019 Facebook document also stated that "Facebook currently does not have a strategy to access programmatic budgets

- Deposition testimony from a Meta executive also indicates that there is little advertiser substitution between social-media ads bought on Meta's properties and open-web advertising bought through exchanges.[429]

- A 2018 Amazon document presented revenues and growth separately across its display and video advertising businesses.[430]
- An eMarketer report on digital advertising from 2020 estimated growth rates for search, display, and video digital advertising separately.[431]
- An IAB Internet Advertising Revenue Report from 2021 assessed the growth rates of digital audio, digital video, social, search, and display advertising separately, relative to total internet advertising revenue growth.[432] The report noted that in 2021, search represented 41.4% of internet advertising revenues, while display and digital video made up 30% and 20.9%, respectively. While search maintained the largest share, video saw the most growth in revenue in 2021.[433] IAB also differentiates in-app from web advertising, calling in-app advertising "a highly desirable and differentiated product."[434]

IV.B.4. Indirect transactions for open-web display advertising provide additional distinct value to publishers and advertisers

(307) Open-web display advertising inventory can be sold through direct or indirect transactions, with the majority of indirect transactions being sold via real-time bidding (RTB).[435] Indirect transactions' annual share of web display advertising has exceeded 80% from 2018–2022, as illustrated in Figure 31 below, consistent with these transaction types providing value to open-web publishers and advertisers.[436]

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outside of social and video" and that "Google is already dominating this [programmatic] multi-billion-dollar market" (Exhibit 15, Deposition of Simon Whitcombe (Meta), September 28, 2023 (FBDOJGOOG_01131238, at -238. -241 (12/09/2020)).

429 Simon Whitcombe, a vice president in Meta's global business group, has said that the lowering of take rates for open-web exchanges has not caused advertisers to shift spending away from Meta and to the exchanges. *See* Deposition of Simon Whitcombe (Meta), September 28, 2023 200:18–202:12.

430 AMZNADTECH-LIT-000000869, at -869 and -871 (10/05/2018).

431 ADOBE–CID30473–0000069722, at -723 and 726 (06/2020).

432 IAB, "Internet Advertising Revenue Report," PWC and IAB, April 2022, https://www.iab.com/wp-content/uploads/2022/04/IAB_Internet_Advertising_Revenue_Report_Full_Year_2021.pdf.

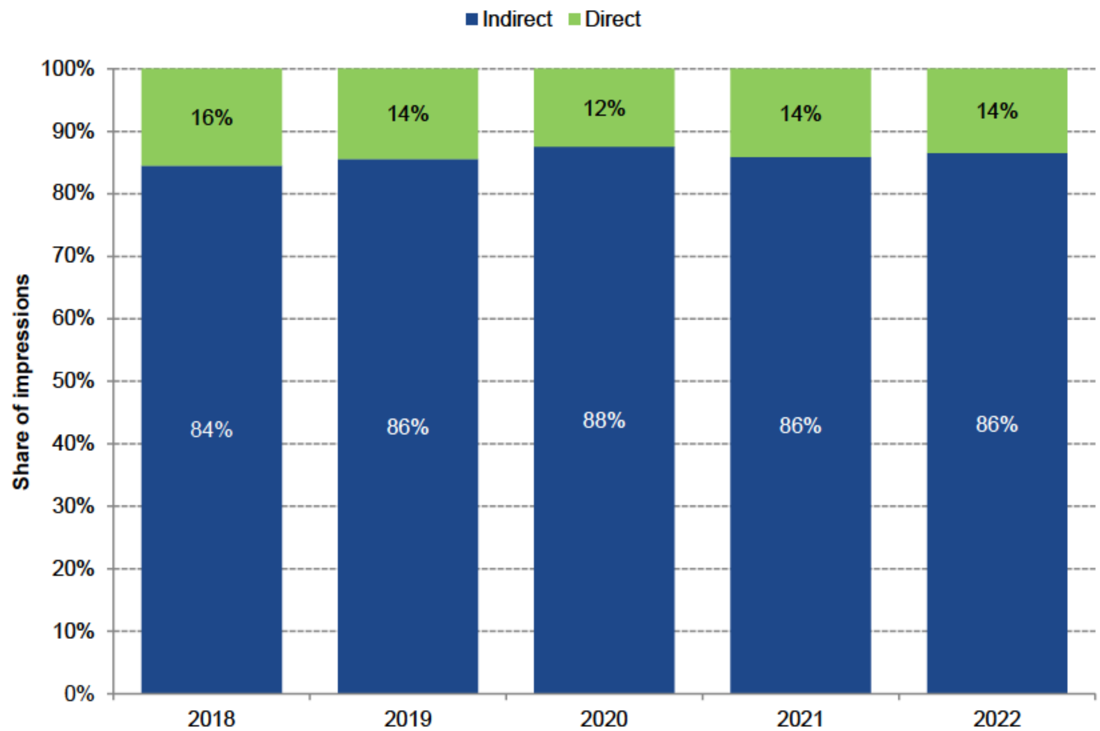
433 IAB, "Internet Advertising Revenue Report," PWC and IAB, April 2022, https://www.iab.com/wp-content/uploads/2022/04/IAB_Internet_Advertising_Revenue_Report_Full_Year_2021.pdf.

434 IAB Europe, "Guide to in-app advertising," IAB Europe, February 2022, 29, https://iabeurope.eu/wp-content/uploads/2022/02/IAB-Europe-Guide-to-In-app-advertising.pptx.pdf.

435 As I note in Section II, while some indirect transactions do not occur via RTB, the vast majority transact via RTB. GOOG-DOJ-03242646, at -689 (09/26/2018) (In 2017 non-programmatic indirect transactions had an "Industry Average Ad Spend" of 2% as compared to 17% for programmatic indirect transactions.).

436 Figure 80 in Appendix C contains results restricted to US publishers. In Section II.A.4, I present spend over time for

Figure 31. Indirect and direct share of worldwide impressions on DFP (2018–2022)



Source: DRX Internal Stats data (DOJ RFP 57).
Notes: Original data report reservation types. Impressions displayed are viewed impressions. Impressions are limited to open-web display advertisements. Sponsorship and standard reservations are considered direct sales. Price priority, network, bulk, and bumper reservations as well as transactions through AdX are considered indirect sales. House ads and unknown reservation type are excluded. Transactions are limited to those paid out in CPM.

(308) As I described in Section II.A.4.b, indirect transactions fulfilled through auctions emerged in the late 2000s to help sell unsold inventory to a large number of buyers in "real-time" after publishers exhausted advertising sold through traditional direct deals.[437] Today, large publishers often monetize their ad inventory with a combination of display advertising sold through direct and indirect transactions.[438]

direct and indirect transactions. *See* Figure 16. The share of spend attributed to direct transactions on DFP was on average 47% between 2018 and 2022.

[437] *See, e.g.*, GOOG-DOJ-03242646, at -674 (09/26/2018) ("Publishers could build on existing partnerships with the benefits of programmatic, including more options to sell advertising placements. Some of these budgets were not always captured through traditional advertising."); *see also* Deposition of Ryan Pauley (Vox), Aug. 23, 2023 62:21–67:12 generally (Vox sells direct deals at substantially higher prices, but would struggle to convert open auction demand to direct demand because of the sales resources involved and because open auction buyers are looking for lower quality inventory at lower prices.). *See also* at 62:4–11 ("The nature of automated and programmatic advertising means that there can be -- a much larger set of potential advertisers can have the option to bid and, ultimately, buy inventory across a number of websites including Vox Media than we could ever employ a sales force to talk to directly.").

[438] *See, e.g.*, Deposition of Tim Craycroft (Google), August 15, 2023, 138:11–138:13 ("Large publishers monetize through a mix of direct sold and then indirect demand that comes in through the exchange.").

(309) There are important distinctions between indirect and direct transactions for open-web display advertising from the perspectives of both publishers and advertisers.

(310) Direct transactions generally garner a higher price for publishers than indirect transactions, but often requires more effort to sell.[439] Direct sales can also help foster valuable long-term relationships with advertising clients as well as providing more certainty over ad content and quality.[440] Direct transactions allow advertisers and publishers to transact guaranteed and "premium" placements and inventory.[441]

(311) Indirect sales, on the other hand, allow publishers to fill remnant inventory that may not easily be filled through direct deals, and can on occasion offer a higher price for a particular piece of ad inventory.[442] The smallest publishers often do not have the sales force or inventory to support direct deals with advertisers, and largely rely on indirect transactions sold via real-time bidding to sell their ad inventory.[443] For example, an executive from Vox, an open-web publisher, testified that it would be "very difficult" to shift from open auction transactions to direct transactions in response to a fee increase for open-auction transactions on ad exchanges.[444]

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439 *See, e.g.*, Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 59:25–60:5 ("Direct display generally requires significant more effort and resourcing in order to sell. It generally is at a meaningfully higher price compared to the Open Auction.").

440 *See e.g.,* GOOG-AT-MDL-001456516, at -522 (06/29/2021) ("With direct sales, news organizations can foster closer relationships with advertisers, selling premium inventory through custom deals, and offering a transparent inventory quality.").

441 *See* discussion in Section II.A.4.a.

442 *See, e.g.*, Deposition of Tim Craycroft (Google), August 15, 2023, 138:14–138:25 ("The direct sold demand is typically a contract to deliver a certain amount -- number of impressions at a certain price. Quite often, you'll have indirect demand coming in from the exchange that's bidding higher than those contracted fixed prices. And there will be cases where you will choose to serve the lower-priced ad that was contractually committed because it's contractually committed to deliver a certain amount by a certain date, even though, if you were to ignore that, the publisher could make more money by letting in an ad from the exchange."). *See also* GOOG-AT-MDL-001456516, at -522 ("Direct deals are an important aspect of news publishers' ad businesses. When thinking about the size of their direct sales force, publishers should start by measuring the cost and revenue produced by each salesperson, and compare that profitability against selling the same inventory programmatically. While direct sales may sometimes generate higher CPMs, many newsrooms shy away from performing this profitability exercise, given the legacy of their direct sales business, even when it may be more profitable to sell the same inventory programmatically. Increasing programmatic share of revenue also allows publishers to free up sales resources that can instead focus on more strategic and creative deals instead of more mundane operational tasks."). The IAB notes that indirect deals enable inventory "to be bought at the highest price and there doesn't have to be a pre-existing agreement between the advertiser and the seller." IAB, "Back to Basics Guide to Programmatic," IAB, https://www.iabuk.com/standards-guidelines/back-basics-guide-programmatic#number2.

443 GOOG-AT-MDL-004216796, at -801–802 (02/24/2011) (Google Display Advertising Ecosystem document states "Large publishers, with the help of their sales teams, make direct deals with advertisers' agencies, and monetize their premium advertising inventory…Similarly, large advertisers purchase their maximum inventory by making direct deals with large publishers. But this model only works for big publishers and big advertisers dealing with each other. Small publishers, on the other hand, can't afford to maintain their own sales force and they don't have inventory to be of interest to large advertisers.").

444 *See* Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 65:25–66:13 ([Given an increase in take rates on OA transactions], "it would be very difficult to transition any demand to from open to direct.").

(312) Just as large publishers sell inventory through a combination of direct and indirect transactions, large advertisers often buy inventory through both direct and indirect routes. While large advertisers use direct deals to purchase premium inventory from large publishers, indirect purchases provide access to additional inventory that is not available for direct purchase.[445] Advertisers value indirect purchases because they offer a "larger marketplace" with "more supply" than direct deals.[446] Indirect transactions also enable advertisers to "tailor their bids and ads in real time to buy the ad space they value the most."[447] Smaller advertisers generally do not participate in direct deals because they do not have the resources to manage direct deals, and because their ads may be of less interest to large publishers.[448] For those reasons, small advertisers more often rely on indirect than direct purchases to facilitate transactions.

(313) Industry participant testimony also supports that direct and indirect transactions have distinct purposes and are not close substitutes.[449]

(314) The distinction between direct and indirect sales is also consistent with the pricing differential that advertisers pay and publishers obtain through direct and indirect transactions. The available data show that open-web display transactions sold via direct sales are sold at higher CPMs than indirect sales, and that difference has persisted over time.[450] Figure 32 shows estimates of indirect and direct CPMs over time for transactions sold on DFP. For both all direct ("Direct") transactions and the

[445] Indirect transactions' annual share of open-web display impressions on DFP has exceeded 80% from 2018–2022, as illustrated in Figure 31. *See also* GOOG-AT-MDL-004216796, at -801–802 (02/24/2011) (Google Display Advertising Ecosystem document states,"[L]arge advertisers … use GDN to target their ads on inventory that's exclusive to GDN and not available for direct deals. … GDN purchases inventory that the advertiser can't buy itself – either because the advertiser is small, or, in the case of large advertisers, the inventory is not available for direct purchase.").

[446] Deposition of John Dederick (The Trade Desk), July 28, 2023, 156:22–157:9 ("[W]hat you get if you're a buyer with an ad network is more supply, bigger supply. … [A]n ad network was the first extension from direct publisher buying into … a larger marketplace.").

[447] Neal Mohan, "A year of the new DoubleClick Ad Exchange: improving large publishers' returns," Google Official Blog,(blog), Jan. 16, 2011, https://googleblog.blogspot.com/2011/01/year-of-new-doubleclick-ad-exchange.html.

[448] *See also* Deposition of Tim Craycroft (Google), August 15, 2023, 48:15–48:21 ("If you look at any ad platform, Facebook, Amazon, Google, it's not cost-effective. It's not sustainable to sell directly to small advertisers with very small budgets. You enable them to advertise through self-service tools.").

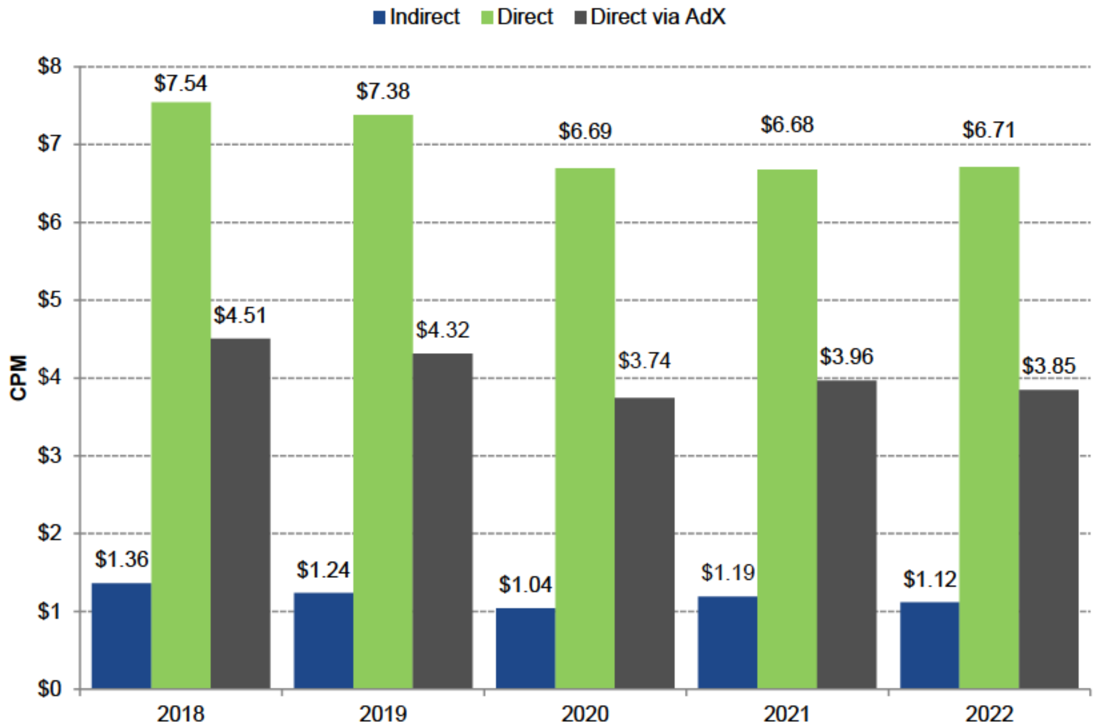
[449] *See* Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 62:21–64:12 ("[I]t's very difficult to convert Open Auction buyers to direct buyers…Most of the direct ad sales is primarily in the brand advertising upper funnel part of the marketing, sort of, tactics. Whereas Open Auction, in my experience, typically is more performance oriented.");

See also Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 66:25–67:12 ("Q. Do you view Open Auction display and direct display as complements or substitutes? A. I view them as complements. Q. Why do you view Open Auction display and direct display as complements? A. Again, generally, because the tactics of the advertiser and what they are looking to achieve are slightly different between direct ad sales and Open Auction.").

[450] [redacted]

subset of direct transactions sold on AdX ("Direct via AdX"), CPMs are much higher than for indirect transactions.[451]

Figure 32. Average CPM of worldwide impressions on DFP by transaction type (2018–2022)



Source: DRX Internal Stats data (DOJ RFP 57)
Notes: Data contain 2018–2022 observations paid out in CPM. CPM is reported as gross revenue divided by impressions. Original data report reservation types. Impressions are limited to open-web display. Sponsorship and standard reservations as well as fixed CPM, preferred deals and programmatic guaranteed are considered direct sales. Price priority, network, bulk, and bumper reservations as well as open auction, private auction, and first look transactions through AdX are considered indirect sales. "Direct via AdX" are direct transactions sold on AdX. House ads and unknown reservation type are excluded. Transactions with greater than $100 CPM or with $0 revenue are excluded.

IV.C. Publisher ad servers is a relevant product market

(315) Publisher ad servers are software products used by publishers to manage and sell open-web display ad inventory through both direct and indirect sales methods (including RTB transactions).[452] A publisher

[451] *See* Figure 82 in Appendix C.3 for statistics restricted to transactions from US publishers. Using the same data, Figure 83 in Appendix C.3 reports results from regressions of publisher CPMs on indicator variables for indirect, direct via AdX, and direct non-AdX transactions, and publisher fixed effects (which controls for across-publisher variation in average CPMs). The results are consistent with publishers tending to earn significantly more revenue per transaction on direct transactions than indirect transactions.

[452] Publisher ad servers can also serve ads other than web display ads. *See, e.g.*, GOOG-DOJ-13218256, at -256 (10/11/2018) (A Google strategy paper that notes that Google Ad Manager and Ad Manager 360 offer a "full stack (display/video in web/app) solution.").

ad server assists a publisher in using various transaction types to maximize display ad revenue. These transaction types include non-programmatic direct reservations, programmatic direct deals (including programmatic guaranteed and preferred deals), and indirect transactions (including private auctions and open auctions).[453]

(316) To manage and select among these different transaction types in real-time, publisher ad servers allow a publisher to set rules and goals for ads being served, and are sometimes referred to as the "decision engine" for a publisher.[454] They typically also provide other features such as collecting and utilizing targeting information, and tracking ad performance and monetization.[455] Publisher multihoming across multiple publisher ad servers for display advertising is rare, and publishers typically use a single publisher ad server for display ads.[456]

(317) The services provided by a publisher ad server are particularly important for large publishers and those with more complex display advertising needs.[457] For example, this includes publishers who need to meet the pricing and scheduling requirements of direct deals while simultaneously seeking to allocate remaining inventory via RTB in a manner that most effectively monetizes their display inventory.[458] Further, publisher ad servers are useful for large publishers because they can provide the

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453 *See* Deposition of Scott Sheffer (Google), July 20, 2021, 79:23–81:22("a typical publisher has a chunk of advertising inventory that they would like to monetize… The challenge for a publisher is that they have typically a direct sales team, which may sell some of that inventory directly at negotiated rates that they do with an advertiser agency. And then they may have other inventory that a publisher may wish to monetize. What an ad server enables a publisher to do is, subject to the publisher's decisions around pricing and scheduling and budgeting, the ad server enables them to run their monetization business according to the rules and the criteria and the setup that the publisher puts in place with that ad server."). *See* Section II.B.1 for additional discussion of the functions of publisher ad servers and the different categories of advertising that it manages.

454 *See* GOOG-DOJ-04429792, at -794 (04/2017). *See also* Deposition of Scott Sheffer (Google), July 20, 2021,79:23–81:22 ("What a [publisher] ad server enables a publisher to do is, subject to the publisher's decisions around pricing and scheduling and budgeting, the ad server enables them to run their monetization business according to the rules and the criteria and the setup that the publisher puts in place with that ad server"); Deposition of Max Loubser (Google), April 21, 2021 167:3–167:20, ("Focusing specifically on the reference to decision logic, how did header bidding present a challenge to DFP with respect to decision logic? A… The decision logic typically referes to the process of the DFP ad server selecting which advertisement to deliver to the publisher's web page or other environment. And in order to make a good decision, where a good decision is one that would be optimal for the revenue of the publisher and then, again, as before, the advertiser's interests and the user's interests.").

455 *See* discussion in Section II.B.1.

456 *See* discussion in Section III.C, fn. 246.

457 Eisar Lipkovitz stated in his deposition that the "majority of [DFP customers] were sort of large publishers, large media companies, you know, big names…and, you know, it's a complicated product, right, so if you don't have a reason to use it, you don't have enough people to operate it, you wouldn't." He characterizes AdSense, a publisher-facing ad network, as a "self service, super simple to use" product for "long-tail" publishers that do not have a lot of impressions and are run by a very small number of people. Deposition of Eisar Lipkovitz (Google), March 31, 2021, 80:18–81:14 and 82:25–83:15.

See also GOOG-DOJ-13218256, at -256 (10/11/2018) ("Google currently offers 5 publisher products: 1. Google Ad Manager 360: Full stack (display / video in web / app) solution for large publishers with 3p demand and direct sales 2. Google Ad Manager: Full stack (display / video in web / app) solution for small- and medium sized publishers with 3p demand and direct sales 3. AdSense: Scalable, automated solution for small, web-based publishers without 3p demand or direct sales").

458 Scott Sheffer, Google's Vice President of Global Partnerships, sell-side monetization stated in his deposition that, "a typical publisher has a chunk of advertising inventory that they would like to monetize… The challenge for a publisher

publisher with one centralized place to manage display advertising across all of the publisher's websites and digital properties.[459]

(318) Google's publisher ad server is DoubleClick for Publishers (DFP), which is part of Google Ad Manager (GAM).[460] GAM is available in two versions: GAM and GAM 360, the latter of which contains greater functionality than the former.[461] I refer to the publisher ad server components of GAM and GAM 360 as DFP for Small Business and DFP Premium, respectively.[462] Other publisher ad servers available to open-web publishers include those offered by Equativ (formerly Smart) and Xandr (formerly AppNexus).[463]

(319) In this section, I explain why there is a relevant antitrust market for publisher ad servers, reviewing:

1. Qualitative evidence regarding the lack of close alternatives to publisher ad servers from the perspective of open-web publishers;
2. Industry recognition that publisher ad servers are a distinct product with functionality substantially different from other ad tech products; and
3. Additional evidence that publisher ad servers lack close substitutes, including direct evidence that Google *already* exercises substantial market power with respect to its publisher ad server product (DFP) that I present in detail in Section V.B.3.

(320) The discussion in this Section establishes the limited substitutability of publisher ad servers relative to alternatives from the perspective of open-web publishers. As I discussed in Section III.C, demonstrating that publishers alone have limited alternative options for a set of open-web ad tech products is sufficient for the purposes of establishing that a firm owning those products would possess market power. Indeed, even *if* advertisers could perfectly substitute away from display advertising on open-web publishers using publisher ad servers in response to higher advertising prices (which is unlikely), this would not prevent a hypothetical monopolist of publisher ad servers from

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is that they have typically a direct sales team, which may sell some of that inventory directly at negotiated rates that they do with an advertiser agency. And then they may have other inventory that a publisher may wish to monetize. What an ad server enables a publisher to do is, subject to the publisher's decisions around pricing and scheduling and budgeting, the ad server enables them to run their monetization business according to the rules and the criteria and the setup that the publisher puts in place with that ad server." Deposition of Scott Sheffer (Google), July 20, 2021, 35:19–35:-22 and 79:19–84:22.

459 For example, Disney uses DFP for all of its display advertising. *See* Deposition of Jeremy Helfand (Disney), September 29, 2023, 132:9–132:13, ("Q. And Disney uses Google Ad Manager, previously known as DFP, to sell all of its display advertising; is that right? A. That is correct."). Examples of Disney's digital properties include ESPN.com, ABC.com, ABCnews.com. *See* Deposition of Jeremy Helfand (Disney), September 29, 2023, 15:22–16:3.

460 *See* discussion in Section II.C.1.

461 *See* discussion in Section II.C.

462 "Google Responses to DOJ Ad-Tech Data Follow-Up Questions (July 10, 2020),"; *"Appendix A – Corrected sell-side rate card – HIGHLY CONFIDENTIAL.xlsx.*"

463 *See* discussion in Section II.B.1.

exercising market power over publishers, due to the lack of close substitutes from the perspective of open-web publishers alone.[464]

(321) Thus, I conclude that a profit-maximizing hypothetical monopolist of publisher ad servers would likely raise quality-adjusted prices substantially over competitive levels, and that therefore publisher ad servers is a relevant product market.

IV.C.1. Open-web publishers lack effective substitutes for publisher ad servers

(322) In Section IV.B.1, I showed that open-web display advertising is an important and distinct form of monetization for open-web publishers, and that other forms of advertising are imperfect substitutes. Here, I discuss why for those publishers seeking to monetize their open-web inventory via display advertising, publisher ad servers lack effective substitutes.

(323) In theory, open-web publishers seeking to monetize their online inventory through display advertising have alternatives to using a third-party publisher ad server, including (1) using products that monetize a publisher's web display inventory solely via forms of indirect advertising (for example, by using Google's AdSense);[465] (2) selling display inventory directly to advertisers (i.e., relying solely on direct sales) without a publisher ad server;[466] or (3) building their own internal ad server.[467]

(324) I consider each possibility in turn and discuss why these are not close substitutes to using a publisher ad server.

(325) Consider the first option. Although not using a publisher ad server for display advertising and relying on AdSense (or any other publisher-facing component of an ad network) instead can potentially serve the needs of some smaller publishers with less complex needs, such an approach would not be a close

[464] That is, in this example, publisher ad server fees would be borne by publishers, potentially in the form of reduced publisher payouts. There is significant evidence that advertisers would also not perfectly substitute away from open-web display advertising available through publisher ad servers if those products charged prices above competitive levels for advertiser access. As I discussed in Section IV.B.2, other forms of advertising are not effective substitutes for open-web display advertising for advertisers. In order to access open-web display inventory of a publisher using a publisher ad server, advertisers typically would have to interact either directly or indirectly with that publisher's ad server. Given that a substantial number of open-web publishers would continue using a publisher ad server even if prices for publisher ad servers exceed competitive levels, an advertiser likely foregoes potentially substantial returns on its advertising investment by completely refusing to engage with publisher ad servers. This logic also applies to firms competing for and representing the demand of advertisers, from the perspective of a publisher, such as ad agencies, advertiser ad networks and DSPs.

[465] *See* Section II.C.3.b for a description of AdSense.

[466] Direct deals between publishers and advertisers can take a number of forms, including guaranteed direct deals, programmatic direct deals, or preferred deals, which can vary in the form of pricing, the level of guarantees and the relationship between the negotiated direct deal and the possibility of filling the space via an indirect auction. *See, e.g.*, GOOG-DOJ-AT-02199478, at -525, -527. *See also* discussion in Section II.A.4.

[467] By "publisher ad servers," for market definition purposes, I mean a publisher ad servers provided by a third party, and not a publisher's self-provision of these services. Self-provision of a publisher ad server is not considered to be in the market for publisher ad servers, but could provide competitive discipline to a hypothetical monopolist of publisher ad servers.

substitute for publishers that would be able to more effectively monetize their inventory using both direct and indirect deals.[468] For such a publisher with more complex monetization needs, there are limited alternatives to a publisher ad server for optimally managing and monetizing display inventory via a wide range of demand sources including direct sales.[469] Google distinguishes between its publisher ad server and ad network products in that the publisher ad server, DFP, is designed for larger publishers "who have significant direct sales," while AdSense, its publisher-facing ad network, is designed for smaller publishers.[470] Even for smaller publishers, an ad network offers reduced control and functionality compared to a publisher ad server.[471]

(326) Consider next the second option. A publisher could choose to rely solely on direct deals with advertisers and forego indirect deals entirely, potentially eliminating the need for a publisher ad server that selects among multiple direct and indirect deals. As I discussed above, such a strategy is

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468 *See* Deposition of Chris LaSala (Google), August 16, 2023, 97:16–97:21, "I think it's fair to state that the feature set in ad servers was more robust than ad networks"; Deposition of Chris LaSala (Google), August 16, 2023, 97:22-98:06 and 98:25-99:16, "Q. Are you aware of a publisher who used an ad network but did not use a publisher ad server? A. I think -- I think many did. Q. Can you give me an example? A. Smaller ones. I don't know names, but -- remember names. But many small -- we call that, I think I mentioned earlier, the torso tail part of the business… Q. For larger publishers, are you aware of a larger publisher using an ad network instead of a publisher ad server? A. … I think it is possible they could, but, typically, in my experience, they didn't.").

469 *See* Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 33:12–34:8 ("Q. How important or not important is a publisher ad server to Vox? A. It is a critical part of the ad technology infrastructure. Q. And why do you say that a publisher ad server is a critical part of Vox's ad technology infrastructure? A. It is at the center of how we make a significant amount of our advertising revenue. Q. What functions does a publisher ad server perform on Vox's behalf? A. It hosts creative. It enables the delivery of website to -- or the delivery of an advertisement to appear on the website. It ensures that the contracts we have with our advertising customers are delivered and are able to be fulfilled in the way that we expect them to. It provides reporting and -- for Vox Media as well as for our advertising customers.").

470 *See* Google, "Compare Ad Manager, AdSense, and AdMob," https://support.google.com/admanager/ answer/9234653 (accessed December 20,2023) ("AdSense is best for publishers who want more automation for their ad solutions, and have a small dedicated ad management team" whereas "Google Ad Manager is an ad management platform for large publishers who have significant direct sales. Ad Manager provides granular controls and supports multiple ad exchanges and networks."; *see also* GOOG-DOJ-13218256, at -266 (10/11/2018) (A Sell-side segmentation strategy paper states "We'll continue to differentiate AM [Google Ad Manager] from AdSense based on its ability to traffic direct sales.").

See also Deposition of Jim Giles (Google), Nov. 6, 2020, 28:12–29:7, ("Q. Have you heard of the term "direct inventory?" A. There are people that use the term "direct," but it can mean different things to different people, so I wouldn't know what you meant by "direct inventory." Q. What does it mean to you? A. So when I think of direct inventory, I think of reservations primarily. So AdSense, I don't – I don't actually don't quite remember, but I don't think that AdSense did – if it reservations, it was light reservations. I don't think it did – it wasn't a full-featured reservations product, I know that for sure. Q. And Google AdManager does work with reservations? A. Google AdManager supports reservations, yes."); Deposition of John Bellack (Google), Oct. 2, 2020, 87:16– ("Q. Thinking specifically about publishers that use AdSense, is there a characteristic that is generally common to those types of publishers? A. What I would probably say is that there are publishers who don't really engage in much direct selling of advertising, and those publishers tended to be satisfied with the features and capabilities of AdSense. . . Q. Can a publisher have direct sales if they were using the AdSense product? A. The AdSense product does not put any restrictions on when [sic] a publisher may choose to do with its business; so there's nothing inherent to using AdSense that would prevent a publisher from doing direct sales."). *See also* discussion in Section II.C.3.b.

471 *See., e.g.*, Deposition of Jim Giles (Google), November 6, 2020, 25:19–25:25 ("The AdSense product is a product that is more automated for publishers who don't need or want as many controls. So it is an ad serving platform for publishers who prefer more automation."). An October 2018 Google strategy paper defines Google Ad Manager 360 as a "solution for large publishers with [third-party] demand and direct sales," Google Ad Manager as a "solution for small- and medium-sized publishers with [third-party] demand and direct sales," and AdSense, Google's ad network, as "a scalable, automated solution for small, web-based publishers without [third-party] demand or direct sales." *See* GOOG-DOJ-13218256, at -56.

not likely a viable option for smaller publishers, and for larger publishers that use both direct and indirect transactions to monetize their ad inventory, foregoing indirect RTB transactions would sacrifice monetizing unsold display inventory that is not allocated to a direct deal.[472] A publisher ad server allows a publisher with open-web display inventory to optimize and manage both direct and indirect sales, and assists a publisher with more complex advertising needs in maximizing the revenue it can obtain from its open-web display inventory.[473]

(327) In addition, publisher ad servers can reduce the costs of negotiating and setting up potentially new or additional direct deals with advertisers.[474] In particular, publisher ad servers enable the use of programmatic direct deals, which industry participants note can be more efficient for advertisers and publishers than traditional direct deals.[475] Publisher ad servers also offer other features that help publishers manage their direct inventory.[476]

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472 *See* Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 64:6–21 ("Q. How easy or difficult would it be for Vox to switch a significant number of ads from Open Auction display to direct display? A. You know, our experience, it would -- it's very difficult to convert Open Auction buyers to direct buyers. Q. And why, in your experience, is it very difficult to convert Open Auction display to direct display? A. Due to the performance-oriented nature of most -- of Open Auction buyers, they are primarily looking for reaching a certain audience at a certain, typically, lower price than -- than our direct ad business would support.").

473 *See* GOOG-DOJ-13218256, at -256 and -266 (10/11/2018) (A Sell-side segmentation strategy paper states, "Google currently offers 5 publisher products: Google Ad Manager 360: "Full stack (display / video in web / app) solution for large publishers with 3p demand and direct sales. Google Ad Manager: Full stack (display / video in web / app) solution for small- and medium-sized publishers with 3p demand and direct sales"), and ("We'll continue to differentiate AM [Google Ad Manager] from AdSense based on its ability to traffic direct sales.").

474 GOOG-AT-MDL-008544607, at -618 (05/01/2020); Deposition of Chris LaSala (Google), August 16, 2023, 286:21–288:7.

475 Before programmatic advertising, direct sales were conducted via what has been referred to as "tag-based advertising" or "traditional direct sales." This required publishers to manually input contract and advertisement details into the code in their website and handle billing and data collection internally. Programmatic guaranteed is a programmatic reservation type that conducts direct sales through the programmatic ad tech stack (including publisher ad servers). This creates efficiencies for publishers by utilizing the interface, data collection and reporting, and billing infrastructure used for RTB sales to do direct sales, meaning publishers no longer need to handle it manually. GOOG-AT-MDL-008544607, at -613–618 (05/01/2020).

Deposition of James Glogovsky (New York Times), Aug. 25, 2023, 148:7–148:19, ("Q. Why is a tagged-based system for display not as effective in your opinion?.. A. The tagged-based solution is not as effective because when the specific tag is entered into the ad server, it will be called by the ad server and it may win, but a bid may not be returned or the bid may not be won, within the tag, and then it would go unfilled and there would be essentially a blank space and the publisher would not earn revenue on that."); Deposition of Chris LaSala (Google), Aug. 16, 2023, 284:8–285:3 ("Q. How does Programmatic Guaranteed differ from open auction? A. So Programmatic Guaranteed was when the publisher and the advertiser negotiated a budget to be spent and then where the budget would be spent would be driven programmatically versus just, like, tag on page, like the way it used to be done before PG existed. So it's, like, a more efficient and effective way of doing a direct deal. And better data, better access to data and information reporting. It's just cleaner. Q. In order to have a Programmatic Guaranteed transaction, the publisher and advertiser had to negotiate a separate deal -- A. That's right. Q. – between each other? A. That's right.").

476 For example, a publisher ad server can manage delivery pacing, the rate at which impressions are delivered during the span of a direct deal. DFP measures traffic and can forecast future traffic to hit a line item's impression total according to a publisher and an advertiser's specifications. *See* Google, "How line item delivery is paced," Google Ad Manager Help, https://support.google.com/admanager/answer/2669484?sjid=7351782279263672648-NA; GOOG-AT-MDL-008544607, at -632 (05/01/2020); *see also* Deposition of John Bellack (Google), October 2, 2020, 60:17–61:7, ("Q. You mentioned for tag-based advertising, the publisher would enter the contract term into the publisher ad server. Which contract terms are entered into the publisher ad server? A. I can't remember this whole list. A lot of what the -- a lot of

(328) A third alternative to using a (third-party) publisher ad server is developing an integrated, internally managed publisher ad server. However, only larger publishers with particular reasons to forego third-party ad serving tend to engage in such an option,[477] even in the presence of Google's substantial market power in publisher ad servers. This is the case for at least two primary reasons:

- First, developing an integrated publisher ad server is an expensive undertaking, and there are significant barriers to creating an alternative to existing publisher ad servers. These include direct costs of building an integrated publisher ad server, and substantial switching costs in the form of monetary expenses, time, and risk when moving from a third-party publisher ad server to an internal ad server.[478] Furthermore, a single publisher may find it difficult to overcome indirect network effects and convince other ad exchanges and other RTB demand sources to incur the effort and expense to connect to its server unless it has a large volume of impressions or significantly differentiated consumers. I discuss these barriers to creating a new publisher ad server further in Section V.B.2.b.
- Second, a publisher with its own open-web publisher ad server would not have unrestricted access to and use of real-time bids from AdX, due to Google's exclusive provision of such access

what the sort of DFP part of the ad system was concerned with were guarantees around delivery, because there was a scheduling algorithm which sort of originated with tag-based advertising and is used with programmatic guarantees. But the idea of, hey, you know, it's important for the ad server know is if you were guaranteeing 10 million impressions over the course of three weeks because you had to pace that out to make sure you would deliver it.").

In addition, a publisher ad server assists with other customization options. Deposition of John Bellack (Google), October 2, 2020, 58:15–60:16, ("Q. Turning now to the information that the publisher ad server receives from the publisher when they are configuring the publisher ad server. What information does the publisher put into the publisher ad server? A. ... There would be things such as security information, who are the users authorized to access their accounts, what kind of permissions they have available, you know, what role they might play. So there's a lot of kind of configuration information. They might be providing information about the structure of their inventory. If it was a website, what are the, you know, pages and sub-pages?… So there's sort of, you know, a hierarchy or an organization of the information they're making available to sell. And they may set up various rules and guidelines to constrain or limit the way the ad server behaves, you know, such as not showing competitive ads next to each other, or there are certain formats they do or don't want to allow. In the case of tag-based advertising, then the publisher, as I stated, would be setting up line-item information about who they're doing business with, and are there any relevant contract terms to the delivery of ads, like is there a quantity or not?… They can indicate which portions of their inventory they wanted to be available for programmatic competition. They could indicate whether they had any programmatic deals negotiated with any specific advertisers. I mean, you know, over time when we introduced exchange bidding. They could indicate other ad exchanges that they wanted to compete programmatically. So they could control a lot of things there as well. And there were lots and lots and lots of configuration settings. That's not meant to be complete, because there was a lot of customization in the product.").

477 As I describe in Section IV.B.1.b, there are particular reasons why some publishers may opt to develop their own integrated advertising products.

478 In July 2020, Xandr discussed switching costs for publisher ad servers in a submission to the European Commission: "A key reason for these companies' inability to challenge Google's dominant position in publisher ad service . . . is the expense and difficulty of switching ad servers. Factors that make it expensive and difficult to switch ad servers include…significant costs associated with the technical reintegration of a new ad server and consequent re-training of the ad operations staff," the short-term dip in advertising revenues, and potential problems with the transfer of data between servers. ATT-GCID-00106990, at -007 (07/29/2020). *See also* Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 95:16–97:17.

and use to DFP. In Section VII.C, I describe this conduct further and discuss evidence that this significantly reduces publishers' incentives to use an alternative to DFP.

IV.C.2. Industry participants recognize that publisher ad servers are a distinct product

(329) Industry participants and observers recognize that publisher ad servers are distinct from other ad tech products used to transact open-web display advertising, indicating that substitution to other products would likely be limited in response to an exercise of market power by a hypothetical monopolist of competitively-priced publisher ad servers.

(330) As I discussed in Section II.B and II.C, various Google documents and testimony from its executives distinguish between publisher ad servers and other ad tech products, and recognize that the role of publisher ad servers is distinct from those of ad exchanges and advertiser ad networks.[479] Google documents also identify different sets of competitors for publisher ad servers, ad exchanges, and advertiser ad networks.[480]

(331) Other industry participants also recognize that publisher ad servers play a distinct role among ad tech products. For example, Xandr analyzes the competitive positioning of its publisher ad server in comparison to other publisher ad servers.[481] Facebook employees and documents also differentiate between ad exchanges and publisher ad servers. When considering alternatives to a partnership with Google's DFP, Facebook looked at partnering with other publisher ad servers and explicitly excluded ad exchanges as alternatives.[482] A February 2018 Facebook internal presentation describes the publisher ad server as "the most important part of the ad tech stack" as a result of it "[o]wning the decision of who wins the publisher impression."[483] A publication from ClearCode, a software development company that builds ad tech products, notes that while it is possible for publishers to use an ad exchange alone without a publisher ad server, publisher ad servers provide unique benefits to publishers.[484]

479 For example, see Figure 19 in Section II.B.

480 *See* Figure 19 in Section II.B, which shows DFP and OpenX as publisher ad servers; AdX, AppNexus, Rubicon, and Index as ad exchanges, and GDN (AdSense and AdWords) and Facebook as ad networks.

481 MSFT-LIT-0000039894, at -094–096 (12/22/2021) (Xandr Monetize Ad Server positioning framework).

482 FBDOJGOOG_00954175, at -176 (02/04/2018) (An email correspondence between Facebook employees regarding a proposed partnership with Google, subject "Google DFP deal qs" states, "We are looking at partnering w[ith] all ad servers and mediators that have >10% mkt share ... App Nexus and OpenX are exchanges not ad servers/mediators so not really relevant to scale.").

483 FBDOJ003286815, at -820 (02/28/2018).

484 For example, publisher ad servers help publishers manage their direct deals and also act as a management platform in the event that no direct deals are available. Having a separate publisher ad server allows publishers to easily switch exchange vendors if needed. ClearCode, "The Main Technology Platforms and Intermediaries in the Digital Advertising Ecosystem," *The Ad Tech Book* Ch. 4, https://adtechbook.clearcode.cc/adtech-platforms-and-intermediaries/.

IV.C.3. A hypothetical monopolist of publisher ad servers would likely charge quality-adjusted prices above competitive levels

(332) A profit-maximizing hypothetical monopolist of publisher ad servers would likely charge (quality-adjusted) prices that significantly exceed competitive levels.[485] Such a hypothetical monopolist likely would do so due to the lack of close alternatives available to open-web publishers, as discussed above. These publishers can be targeted with price increases individually or by offering different versions of the product targeted to different consumer types.[486]

(333) Moreover, as I will detail further in Section V.B, there is direct evidence that Google's publisher ad server product, DFP, possesses significant market power. In that section, I describe Google documents indicating higher DFP fees would increase its profit. I also discuss DFP's deviations from competitive behavior, including actions it took to reduce its quality in order to meaningfully advantage AdX. All of this indicates evidence that Google faces limited constraints on its market power from customer substitution away from DFP.

(334) Hence, publisher ad servers is a relevant product market.

IV.D. Ad exchanges is a relevant product market

(335) Ad exchanges are software products that facilitate the indirect real-time programmatic sale of open-web display ad inventory by connecting publisher ad servers with multiple demand sources, including from DSPs and advertiser ad networks.[487] As I explained in Section II.B.3, ad exchanges allow publishers through their publisher ad servers to access advertiser demand through DSPs and networks via RTB.[488] In this role, ad exchanges also share data with and collect bids from demand partners that participate in the auction.[489]

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485 A monopolist of publisher ad servers that also owned complementary products might also exercise market power in the publisher ad server market by reducing its quality to increase sales of complementary products (see Section V.B.3.b).

486 As I discussed in Section II.D, Google offers two versions of DFP (Premium and Small Business) with different fees, and as I discuss in Section V.C.3, there is evidence that Google is able to charge varying prices for DFP Premium to different publishers.

487 While ad exchanges have begun to facilitate some direct transactions, such as Programmatic Guaranteed and Preferred Deals, the vast majority of transactions on exchanges are indirect, most often filled through RTB (see discussion in fn. 115). As a result, I consider indirect open-web display transactions to be the relevant set of transactions for the ad exchange market. For the purposes of exchange market shares calculations in Section V, I include transactions facilitated through Open Auction, Private Auction, Open Bidding, Header Bidding, and Private Marketplace and exclude direct deals such as Programmatic Guaranteed and Preferred Deals.

488 GOOG-DOJ-04429792, at -795 (04/2017) (Google presentation, "Sell Side Platform (SSP)/Exchange – service for managing multiple programmatic monetization sources of online display inventory, DSP and ad networks are considered 'Buyers', and publishers and publisher networks are considered 'Sellers'").

489 As discussed in Section II.B.3, since SSPs and ad exchanges have largely been merged into the same products, I use the term "ad exchanges" to refer to services provided by both SSPs and exchanges.

(336) Google's ad exchange is AdX, which is part of Google Ad Manager (GAM). Other ad exchanges include those offered by OpenX, PubMatic, Magnite (formerly Rubicon), Xandr (formerly AppNexus), and IndexExchange.[490]

(337) In this section, I explain why there is a relevant antitrust market for ad exchanges, reviewing:

1. Qualitative evidence regarding the lack of close substitutes to ad exchanges from the perspective of publishers and advertisers;
2. Industry recognition that ad exchanges are a distinct product with functionality substantially different from that of other ad tech products;
3. Additional evidence that there are few close alternatives to ad exchanges, including direct evidence of Google's substantial market power with respect to its ad exchange product (AdX) that I present in further detail in Section V.C.3.

(338) For the above reasons, I conclude that a profit-maximizing hypothetical monopolist of ad exchanges would likely raise quality-adjusted prices significantly over competitive levels, and therefore that ad exchanges is a relevant product market.

IV.D.1. Open-web publishers and advertisers lack close substitutes for ad exchanges

(339) In Section IV.B I described the distinctiveness of open-web display advertising sold via indirect transactions relative to other forms of advertising from the perspective of publishers and advertisers. Here, I examine potential alternatives to ad exchanges that are theoretically available to publishers and advertisers seeking to advertise their products through open-web display advertising and describe why these alternatives are not close substitutes. Potential alternatives include direct deals and other ad tech products including publisher ad servers, DSPs, and advertiser ad networks.

(340) Before proceeding, note that ad exchanges offer specific functionalities and benefits that are not replicated in full by alternative methods or products. Most importantly, ad exchanges provide publishers using publisher ad servers access to real-time bids from multiple demand sources and bidding tools. Using ad exchanges, publishers can monetize their digital inventory without the need to form individual relationships with all of the various demand sources that bid into a given ad exchange.[491]

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[490] *See* GOOG-DOJ-AT-00855803, at -805 (11/2020). *See also* Deposition of Tim Craycroft (Google), August 15, 2023, 91:2–91:9 (describing AppNexus, OpenX, and Rubicon as "all offer[ing] ad exchanges, SSPs that you can connect to generally any ad server. You can use any of those SSPs with DFP instead of using AdX").

[491] *See* Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 62:21–63:7, ("Q. Why is Vox able to sell -- and I apologize, this is a little repetitive. Why is Vox able to sell display ads to more advertisers through Open Auction than through direct

(341) Next, I discuss potential alternatives to ad exchanges for both publishers and advertisers.

(342) First, in theory, publishers and advertisers could attempt to substitute away from ad exchanges by increasing their reliance on direct deals. However, as I discussed in Section IV.B.4, publishers are likely limited in their ability to forgo indirect and RTB transactions in favor of direct transactions. Moreover, the widespread adoption of ad exchanges by publishers and advertisers to transact indirect display inventory is consistent with ad exchanges serving a need unfulfilled by direct transaction types.[492,493]

(343) Second, for publishers, publisher ad servers are not close substitutes for ad exchanges. The services provided by publisher ad servers are largely complementary to those provided by ad exchanges. Ad exchanges connect with and run real-time auctions among DSPs and other demand partners, and then typically submit the winning bid for consideration by a publisher's publisher ad server against other real-time bids or direct deals.[494] Without ad exchanges, publisher ad servers have limited access to real-time sources of advertising demand, bidding that is very valuable to publishers.[495, 496]

(344) Third, for advertisers, DSPs are not close substitutes for ad exchanges. DSPs provide programmatic ad purchasing services and bidding optimization services for advertisers and ad agencies, and

display? A. Because of the nature of programmatic ad technology, there are -- there can be many more buyers that -- in an automated way that can have access to any individual display impression including those that Vox Media owns and sells.").

[492] "Initially, publishers sold space to advertisers via direct sales by finding advertisers willing to display their ads on their websites…Direct sales brought about the problem of fill risk; because some inventory could end up unsold, there was a need for an intermediary, a technological platform that would efficiently sell remnant inventory and automate the process. That's where the ad network came in… When real-time bidding (RTB) was introduced in the late 2000s, network optimizers [that worked with ad networks] morphed into a new type of AdTech platform, which we know today as supply-side platforms (SSPs)." Michal Wlosik and Maciej Zawadzinski, "What is a Supply-Side Platform (SSP) and How Does It Work?," Clearcode, October 18, 2018, https://clearcode.cc/blog/what-is-supply-side-platform/. *See* Section II.D.4 for more information.

[493] There is some evidence that advertising customers would not substitute away meaningfully from ad exchanges in the event of a meaningful price increase on open auction transactions through exchanges. *See* Deposition of Susan Schiekofer (GroupM), September 26, 2023, 105:21–106:8 ("Q. Okay. If an exchange increases its display open auction take rates from 20 percent to 21 percent, would GroupM be more likely to try to shift impressions to another exchange, or to another type of advertising like insertion order-based display ads or social? A. Unlikely to make big changes based on that unless there was some drop-off in performance."). Note that the GroupM deposition discusses substitution at AdX's prevailing prices (20%) that are higher than competitive levels. Evidence that customers would be unlikely to substitute to other types of transactions given a price increase relative to prevailing supracompetitive prices is stronger evidence than needed to satisfy a hypothetical monopolist test.

[494] As I discussed in Section II.E, this submission may occur either directly or indirectly through header bidding.

[495] *See* Section IV.B.4.

[496] Similarly, header-bidding wrappers are not substitutes for ad exchanges, primarily since they rely upon ad exchanges to access advertiser spending and other demand sources. *See, e.g.,* Deposition of Tim Craycoft (Google, formerly Amazon), August 15, 2023, 63:3–63:11 (In discussing Amazon's server-side header-bidding product, TAM: "Q. Did you have an opinion as to whether TAM was a threat to AdX? A. I did not see it as competing with AdX. Saw it as providing supplemental demand. There are five or six exchanges out there, and we didn't see it as a threat to all of them. We saw a way to make them all work better together.").

primarily rely on ad exchanges to bid on open-web display inventory. In this sense, like publisher ad servers, DSPs provide services that are largely complementary services to those of ad exchanges.[497]

(345) Last, advertiser ad networks that either do not provide real-time bids, or do not connect into a publisher ad server, are also not close substitutes for ad exchanges. Advertiser ad networks that do not provide real-time bids deny publishers and advertisers the distinct benefits of RTB transactions described above (see Section IV.B.4). Advertiser ad networks that do not connect into a publisher ad server are unable to be used by publishers wishing to compare these bids against those received from other bidding sources (e.g., ad exchanges) or against direct deals within a publisher ad server. Consequently, as with DSPs, these types of advertiser ad networks are not close substitutes to ad exchanges.[498]

[497] Generally, DSPs do not directly connect with publishers or their publisher ad servers. There are limited exceptions, including Google's Demand Product (also referred to as "Ad Connector" or "Yavin") and Trade Desk's "Open Path" products. In both cases, these products provide access only to a limited set of advertiser demand relative to ad exchanges. Moreover, these products have seen limited adoption and would not likely constrain a hypothetical monopolist of ad exchanges from exercising market power. According to Google, since 2018, six publishers (three with the US as a billing country) have used Ad Connector. *See* Letter from David R. Pearl to Kelly Garcia, "Re: *United States, et al. v. Google LLC*, No. 1:23-cv-00108-LMB-JFA," October 6, 2023, at 3 ("Starting in 2018, six publishers have utilized Yavin/Ad Connector during various years. Those publishers are: [redacted]." The letter identifies publishers marked with an asterisk as having a US billing country.). Internal analysis of Google data corroborates Demand Product's limited usage and adoption. *See* Appendix K.3.

[498] I also include publisher-facing components of ad networks that submit real-time bids into publisher ad servers as products within an ad exchange market, even though such ad networks may not consolidate demand across as wide a range of demand sources as ad exchanges do. For example, while not its primary purpose, AdSense, the publisher-facing component of Google's GDN ad network, can also solicit some small amount of demand from bidding tools other than Google Ads. In 2022, among AdSense transactions "backfilled" into DFP, the HHI (a measure of concentration obtained by summing the squared market shares for each product) of open-web display impressions across bidding tools was 5,477, with 71% of transactions involving Google Ads (*See* Google AdSense data (DOJ RFP 52)). In contrast, among the exchanges I have data for, AdX, Index Exchange and YieldMo had the largest HHIs across bidding sources in 2022. AdX, Index Exchange and Verizon had HHIs of 3,648 (*See* Google AdX data (DOJ RFP 53)), 2,894 (*See* Index Exchange exchange data) and 1,725 (*See* Verizon exchange data), respectively.
AdSense, despite primarily used by publishers outside of a publisher ad server, is also able to provide real-time bids into DFP. A 2017 Google document indicated that "the most common practice" among publishers using AdSense within DFP is using it alongside AdX, and that this practice is a "legacy integration" that Google considered deprecating (GOOG-DOJ-12449378, at -386 and -388–389 (04/27/2017)). A 2018 document titled "SellSide Guiding Principles," described AdSense as "a self-service platform for Web publishers that do not have direct sales to monetize their content. AFC [AdSense for Content] focuses on automation and offers limited controls to publishers… AdSense sometimes acts as a Network product since it can be booked into another ad server" (GOOG-DOJ-04004392, at -393 (2018)). Google's current recommended "best practice" for AdX is "deactivating AdSense when using Ad Exchange" as "AdSense and Ad Exchange can't be called at the same time." (Google, "Best Practices for Ad Exchange Line Items," Google Ad Manager Help, https://support.google.com/admanager/answer/7278551?hl=en.).
This "backfill" component of AdSense comprised only 12% of total impressions transacted through AdSense in 2022 (Google AdSense data (DOJ RFP 52) and Google AdSense Backfill data (DOJ RFP 7)). For these reasons, I include AdSense impressions that are fulfilled through DFP or a publisher ad server for the purposes of computing market shares among ad exchanges. *See* Section V.D.2 for further discussion.

IV.D.2. Industry participants recognize that ad exchanges are a distinct product

(346) Industry participants have recognized the distinctiveness of ad exchanges relative to other ad tech products, indicating that substitution to other products would likely be limited in response to an exercise of market power by a hypothetical monopolist of competitively-priced ad exchanges. For example:

- As discussed in Section II.B, internal Google documents and depictions of the ad tech stack identified ad exchanges as a distinct part of the stack with a distinct set of competitors.[499]
- As I discuss later in this report, when Google internally discusses actions that benefit AdX, it has often described the effects they would have on other ad exchanges. For example, a 2019 memo suggested that the migration to first-price auctions would greatly benefit AdX and disadvantage other ad exchanges.[500]
- In an internal email exchange, one Facebook executive noted that it is vital for Facebook's demand platform to have access to third-party supply, and that access is controlled by companies who operate ad exchanges.[501]
- In its responses to the French Competition Authority, AppNexus (now Xandr) noted that ad exchanges are "critical to programmatic advertising" and distinct from other ad tech products.[502] For example, while ad networks and ad exchanges share similar characteristics, ad exchanges "use more programmatic means to enable advertisers to access difficult-to-reach inventory such as user-generated content or niche sites where ad networks may not have existing relationships."[503]
- The Interactive Advertising Bureau ("IAB"), the trade organization that represents the digital advertising community, differentiates between ad exchanges and other ad tech products. While it recognizes that ad networks also provide aggregated inventory to advertisers, it defines ad exchanges as distinct in that they provide a direct sales channel between buyers and sellers and can facilitate automated, auction-based, real-time bidding transactions.[504]

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499 *See, e.g.*, Section II.B, Figure 18 and Figure 19.

500 GOOG-DOJ-10296947, at -947 (02/15/2019).

501 FBDOJ001489822, at -823 (05/08/2014).

502 ATT-GCID-00000001, at -034 (10/10/2017) (AppNexus responses to FCA's RFI) ("Ad exchanges are critical to programmatic advertising because they are the marketplaces in which advertisers and publishers buy and sell ads in real time.").

503 MSFT-LIT-0000046646, at -664 (10/10/2017) (AppNexus responses to FCA's RFI).

504 IAB, "IAB Glossary of Terminology," IAB, https://www.iab.com/insights/glossary-of-terminology/.

(347) Though Google introduced Google Ad Manager (GAM) in June 2018 which contains both DFP and AdX,[505] it has subsequently in internal analyses still identified its publisher ad server and ad exchange as separate products.[506] In addition, it prices the publisher ad server (DFP) and ad exchange (AdX) components of GAM separately.[507]

IV.D.3. A hypothetical monopolist of ad exchanges would likely charge quality-adjusted prices above a competitive level

(348) A profit-maximizing hypothetical monopolist of ad exchanges providing real-time bids for open-web display ads would likely charge (quality-adjusted) prices that significantly exceed competitive levels. Within open-web display advertising, the market power of such a hypothetical monopolist primarily arises from the position of ad exchanges in the ad tech stack—as the intermediating layer between publishers and their publishers ad servers, and DSPs and advertiser ad networks used by advertisers and ad agencies—and the difficulties in circumventing this layer, as discussed above.

(349) As discussed earlier, because ad exchanges facilitate transactions between two distinct sets of agents, an exercise of market power requires only that *either* (a) publishers (or firms representing their supply from the perspective of ad exchanges) *or* (b) advertisers (or firms representing their demand from the perspective of ad exchanges) would not substantially substitute away from ad exchanges priced above competitive levels. The evidence provided above indicates that substitution by both advertisers and publishers to alternatives would not be sufficient to defeat an exercise of market power by a hypothetical monopolist, and that publishers and advertisers are willing to bear fees significantly above competitive levels to transact display ads through ad exchanges.

(350) Moreover, as I will discuss in detail in Section V.C.3, there is significant direct evidence that Google has been able to exercise substantial market power in the ad exchange market with its AdX product. For example, AdX's take rate of 20% is significantly higher than the average of its competitors and has been stable for the past decade. In addition, Google has been able to dynamically adjust its reserve prices (i.e., price floors) and use AdX to favor its own products in the ad tech stack even while degrading the quality of AdX by not providing real-time bids into rival publisher ad servers. During that time, a range of out-of-market advertisement options have grown in significance. These

[505] *See* discussion in Section II.C, fn.124.

[506] *See* GOOG-AT-MDL-000992438, at -438 (03/2022), ("We have now retired the DoubleClick brand, but internally, the products are still referred to as DFP and AdX.").

[507] *See* Section II.D. *See also* GOOG-AT-MDL-000992438, at -438 (03/2022) (The Korula Declaration states "Up until at least December 2021, it was possible for a publisher using Google Ad Manager to exclude AdX from the sale process altogether.").

options include "connected" and over-the-top TV services,[508] audio,[509] and social media sites such as TikTok, SnapChat and Facebook.[510] A lack of a price response from AdX, and its ability to degrade the quality of its product without losing substantial share, is consistent with out-of-market options imposing limited constraints on the market power for a hypothetical monopolist of ad exchanges for open-web display.

(351) Hence, ad exchanges is a relevant product market.

IV.E. Advertiser ad networks is a relevant product market

(352) Advertiser ad networks are bidding tools used by advertisers to purchase open-web display inventory.[511] Advertiser ad networks typically allow advertisers to bid on a cost-per-click (CPC) basis rather than a cost-per-impression (CPM) basis, which requires that the network estimate the likelihood of an impression becoming a click, since publishers are typically paid for display inventory

[508] IAB, "IAB internet advertising revenue report: 2018 full year results," PWC and IAB, last modified May 2019, https://www.iab.com/wp-content/uploads/2019/05/Full-Year-2018-IAB-Internet-Advertising-Revenue-Report.pdf. ("As consumers shift away from traditional media, digital leads the way in regaining their attention, first from desktop to mobile devices and more recently to connected TV, audio devices, and digital out of home…"). They echoed the rising significance of TV services for the first half of 2019 in the 2019 first six months results. *See* IAB, "IAB internet advertising revenue report: 2019 first six months results," IAB, October 2019, 5 https://www.iab.com/wp-content/uploads/2019/10/IAB-HY19-Internet-Advertising-Revenue-Report.pdf: "We are firmly in the third revolution of television content… publishers have indicated they are increasingly leveraging OTT to go direct to consumer…As viewers shift their behavior towards CTV, advertisers are following."

[509] IAB, "IAB internet advertising revenue report: 2019 first six months results," IAB, October 2019, 18 https://www.iab.com/wp-content/uploads/2019/10/IAB-HY19-Internet-Advertising-Revenue-Report.pdf: digital audio advertising revenue reached $1.2 billion in HY 2019, "a 30.1% increase over HY 2018 revenue."

[510] IAB, "IAB internet advertising revenue report: 2019 first six months results," IAB, October 2019, 17 https://www.iab.com/wp-content/uploads/2019/10/IAB-HY19-Internet-Advertising-Revenue-Report.pdf: social media advertising total revenue grew 30.6% between FY 2017 and 2018. In IAB, "IAB internet advertising revenue report: 2019 first six months results," IAB, October 2019, 21: "Social media advertising continues its ascent with revenues growing 25.7% in HY 2019 compared to HY 2018."

[511] *See* discussion of ad networks in Section II.B. An advertiser ad network may be bundled with a publisher-facing product, with the bundle being labeled as an "ad network" (for example, Google Ads and Google AdSense are advertiser-facing and publisher-facing components of Google's display ad network).

on a CPM basis.[512] Advertiser ad networks often also provide proprietary data to faciliate audience targeting.[513]

(353) Advertiser ad networks are distinct from DSPs, which cater primarily to sophisticated advertisers whose campaigns are typically managed by media agencies.[514] Larger and more sophisticated advertisers often use DSPs to manage and implement their advertising campaigns, but often also use advertiser ad networks to access additional sources of ad inventory. Smaller and less sophisticated advertisers, on the other hand, generally use advertiser ad networks and not DSPs for reasons discussed below.[515]

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512 *See, e.g.*, Deposition of Brad Bender (Google), Oct. 16, 2020, 87:13–88:16 ("From my time there, the majority of [GDN] buyers, if I recall correctly, were buying on a cost-per-click basis. So they would only pay if a user actually clicked on an ad. Of course, that's very valuable to the buyers because they can run their campaigns, you know, diminishing their risk because they only have to pay when a user has clicked."); Deposition of Scott Spencer (Google), Aug. 12, 2023, 115:19–116:20, ("Q. Let me ask this, then: Is the change in the rev share that AdWords is taking for an impression, can that vary on where the impression is coming from? A. Sure. It will vary on a lot of factors. Q. So could an impression from one publisher receive a lower revenue share from AdWords versus an impression from another publisher that might get a higher revenue share? A. So the revenue share for AdWords is even more complicated because it can be done on a cost-per-click basis. So if one publisher gets no clicks but they're paid an impression because it estimates the CPM for it, the rev share could be infinite that that publisher's getting because there was no click, there was no revenue, but the publisher got paid. Q. And CPM means cost per click; correct? A. No. CPM is cost per thousand impressions. Q. And CPC means cost per click; correct? A. Yes, CPC is cost per click. Q. And I think you said AdWords estimates this? A. Yes. Q. And how does AdWords estimate the cost per click? A. I don't -- no, they don't estimate the cost per click. The cost per click is what is being bid by the advertiser. They'll offer the advertiser the ability to buy impressions on a cost-per-click basis. It then figures out what the impressions are worth to get that cost per click.").

513 *See* discussion of advertiser ad networks in Section II.B.

514 Documents describe DV360, Google's DSP, as "Google's programmatic buying platform for agencies and sophisticated marketers" and notes that the main buyers on DV360 are "Big 5 agencies, boutique agencies, direct marketers, Google Internal Marketing." *See* GOOG-DOJ-12949969, at -970 (08/27/2019). *See also* Deposition of Eisar Lipkovitz (Google), March 31, 2021, 90:3–90:8 ("The vast majority of [DSP customers] were actually agencies acting as an agent on behalf of their large advertisers."). This is not only true for Google, but for other DSPs as well. For example, "When The Trade Desk was founded almost 10 years ago, it seized an opportunity to win over agencies by pitching itself as a pure, agency-only platform." *See* James Hercher, "How the Trade Desk Has Evolved For the Next Stages of DSP Growth," AdExchanger, last modified February 27, 2019, https://www.adexchanger.com/online-advertising/how-the-trade-desk-has-evolved-for-the-next-stage-of-dsp-growth/. An undated Google slide deck titled "DBM Optimization" describes several distinctions between advertisers who use GDN (Google Ads) or other ad networks and advertisers who use DBM (DV360) or other DSPs. The slide deck indicates that GDN advertisers are "focused on sales ('conversions') at [a] good ROI [return on investment]," not budget constrained, use "always on" campaigns, and that the distribution of GDN advertisers includes notable large advertisers, such as Booking.com, Wayfair, and Finish Line, but also includes a meaningful long tail of small advertisers. In contrast, DBM advertisers focus on a mix of brand recognition and direct response, are "head advertiser heavy" (e.g., Lenovo, Proctor & Gamble, and Netflix) have complex goals, may use ad agencies face important budget constraints, and have ad campaigns structured in flights. GDN advertisers primarily "Pay for Clicks" while DBM advertisers primarily "Pay for Impressions" and the two sets of advertisers may follow very different bidding strategies. *See* GOOG-DOJ-03151263, at -266–269 (n.d.); *See, e.g.*, GOOG-DOJ-09153922, at -923 (09/2017), ("GVP Offsite – Sales Feedback" notes that small advertisers use AdWords (now Google Ads) while large advertisers and agencies use DV360).

515 *See*, *e.g.*, Deposition of Eisar Lipkovitz (Google), March 31, 2021, 93:3–94:3 (advertising agencies are the primary customers of DSPs; networks serve agencies, large advertisers, and tiny advertisers; a very small advertiser would have no reason to use a DSP) and 100:10–101:5 (it would make no sense for an advertiser spending $1,000 a month to use DoubleClick Bid Manager (today, DV360)). *See also* Deposition of Eisar Lipkovitz (Google), March 31, 2021, 315:20–317:8 ("Really, the key point there is the advertiser is not in full control of each impression, because the advertiser chose to outsource that work to Google Ads, right. And if it's a small advertiser, frankly, that's the only thing they can do.

(354) Google's advertiser ad network product is Google Ads.[516] Criteo also offers an advertiser ad network product,[517] and Facebook Audience Network ("FAN") provided an advertiser ad network with access to open-web publishers until 2020.[518]

(355) In this section, I explain why there is a relevant antitrust market for advertiser ad networks, reviewing:

1. Qualitative evidence regarding the lack of close alternatives to advertiser ad networks from the perspective of advertisers and open-web publishers;
2. Industry recognition that advertiser ad networks are a distinct product with functionality substantially different from that of other ad tech products;
3. Additional evidence that there are few close alternatives to advertiser ad networks, including direct evidence of Google's substantial market power with respect to its advertiser ad network product (Google Ads) that I present in further detail in Section V.D.3.

(356) Thus, I conclude that a profit-maximizing hypothetical monopolist of advertiser ad networks would likely raise quality-adjusted prices substantially over competitive levels, and that therefore ad networks is a relevant product market.

Like they have no idea how to do anything better, right."); Deposition of Dan Taylor (Google), Sep. 17, 2021, 41:14–44:18.

[516] *See* Section II.C.3.

[517] A 2018 Google document describes Criteo as a "[C]ompetitive performance ad network" and lists Facebook Ads as the only other display ad network competitor. *See* GOOG-AT-MDL-003977297, at -312 (03/2018) ("Buyside deepdive"). *See also* GOOG-DOJ-03608886, at -887 (05/09/2013). Criteo allows for CPC-to-CPM pricing (CRI-00000149, at -160 (10/02/2018); CRI-00000179, at -182 (09/20/2018)). *See also* Deposition of Todd Parsons (Criteo), September 8, 2023, 170:8–171:3 ("Q. And do most of Criteo's advertiser customers pay Criteo on a cost-per-click basis? A. Yes, they do. Q. And when Criteo is purchasing inventory for those advertisers, is it typically buying it on a CPM basis? A. Yes.") Criteo also offers a self-service platform (CRI-00000179, at -184 (09/20/2018)). However, Criteo also offers features that are more commonly offered by DSPs, like managed service for agency operators, and many competitors and Criteo itself publicly reject the ad network label (Ronan Shields, "CRO Brian Gleason on why Criteo is 'not an ad network,'"*Digiday*, Aug. 22, 2022. https://digiday.com/media/cro-brian-gleason-on-why-criteo-is-not-an-ad-network/). Criteo might be considered both an ad network and a DSP; I am conservative in my analysis of Google Ads' market power by including Criteo in the advertiser ad network market.

[518] Allison Schiff, "Facebook Is Killing Off Its Web Supply In Audience Network – And Don't Be Surprised If It All Shuts Down," *AdExchanger*, last modified February 5, 2020, available at https://www.adexchanger.com/platforms/facebook-is-killing-off-its-web-supply-in-audience-network-and-dont-be-surprised-if-it-all-shuts-down/. *See also* Section V.B.2.b for further discussion of Facebook Audience Network. Yahoo (Yahoo! Native) and Microsoft (Microsoft Audience Network) also offer ad network products but focus only on native ads. Yahoo, "Native Advertising," Y!Native, accessed December 21, 2023, https://gemini.yahoo.com/advertiser/home; Microsoft, "Microsoft Audience Network," accessed December 21, 2023, https://about.ads.microsoft.com/en-us/solutions/microsoft-audience-network.

IV.E.1. Advertisers and open-web publishers lack close substitutes for and derive significant value from advertiser ad networks

(357) The market power of a hypothetical monopolist of advertiser ad networks arises from advertisers (or firms representing advertiser demand from the perspective of ad networks) and open-web publishers not having close substitutes.[519] This implies that a hypothetical monopolist of advertiser ad networks would likely be able to charge (quality-adjusted) fees significantly above competitive levels for transacting open-web display advertising without reducing its transaction volume significantly enough for the fee to be unprofitable.

(358) Within open-web display advertising, advertiser ad networks provide value through their provision to smaller, less sophisticated advertisers of an accessible way to purchase open-web display inventory, and their provision to advertisers more broadly the ability to purchase display advertising on a CPC-basis. These features tend to attract unique advertising demand that is not available through DSPs which, in turn, provides open-web publishers seeking to efficiently monetize their online properties significant value from having advertiser ad networks bid on their display inventory than forgoing them altogether.

(359) I discuss these points further below.

IV.E.1.a. Advertisers lack close substitutes for advertiser ad networks

(360) From the perspective of advertisers, alternative methods of accessing open-web display inventory include direct deals and DSPs. These alternatives are not close substitutes for advertiser ad networks.

(361) First, some advertisers do not view direct purchases as a close substitute for ad networks, as direct sales require advertisers to make and maintain direct connections with publishers, which requires substantial time and effort,[520] and smaller, less sophisticated advertisers are unlikely to significantly substitute away from buying through ad networks towards buying inventory directly if faced with advertiser ad network prices above competitive levels.[521] Large advertisers, who may purchase premium inventory through direct deals with large publishers, do not likely view direct deals as a close substitute for indirect sales purchased through advertiser ad networks.[522] Moreover, ad networks can provide advertisers access to inventory that is not available through direct deals.[523]

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[519] Publishers can access advertiser demand through advertiser ad networks directly by calling them from their publisher ad server or header bidding implementation, or indirectly through ad exchanges into which advertiser ad networks bid.

[520] GOOG-DOJ-14436571, at -625 (06/24/2019) (Google Business Forecast Meeting deck); GOOG-DOJ-AT-01592535, at -543 (03/2019) (Google Introduction to EMEA Sellside deck).

[521] GOOG-AT-MDL-004216796, at -802 (02/2011) (Google Display Advertising Ecosystem document, "Small advertisers do not have agencies to help them target ads and their ads are of no interest to large publishers.").

[522] *See* discussion in Section IV.B.4.

[523] GOOG-AT-MDL-004216796, at -802 (02/2011) (Google Display Advertising Ecosystem document). ("GDN purchases

(362) Second, DSPs are meaningfully differentiated from advertiser ad networks: they have significantly different features,[524] cost structures (i.e., CPC vs. CPM bidding),[525] and pricing.[526] I discuss these differences below.

(363) With respect to features, Eisar Lipkovitz, former VP of Engineering for Google's Display & Video division, described the differences in features of an ad network and a DSP as the difference between, for advertiser ad networks, "a very simple UI . . . where you give us your objective . . . [to] try to get clicks or conversions or whatnot, and the network does everything automatically for you and you get a good outcome" whereas DSPs include "very complex super features that, in order to run a campaign, you need to have somebody super knowledgeable."[527] Mr. Lipkovitz also stated that, while large advertisers with complex marketing campaigns may derive value from using both an ad network and a DSP, small advertisers "have no reason" to use a DSP.[528]

(364) Consistent with the description that advertiser ad networks offer features that cater to less sophisticated advertisers, a slide from a 2020 Google presentation, shown as Figure 33 below, depicts Google's DVAA (Display Video Apps and Analytics) products, and shows Google's advertiser ad network, Google Ads (referred to as "AdWords/GDN" in the figure), as catering to marketers with lower sophistication than those of Google's DSP, DV360.

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inventory that the advertiser can't buy itself – either because the advertiser is small, or, in the case of large advertisers, the inventory is not available for direct purchase.").

[524] Some of the "key differentiators" between DV360 and Google Ads include their cross-channel features and reservation capabilities. DV360 offers unique features like TrueView and cross-channel optimization across O&O and third-party exchanges. GOOG-DOJ-09163024, at -024–025 (10/01/2018) (Google DV360 strategy document). While AdWords only supports Open Auction transactions, DV360 allows advertisers to enter into one-on-one deals with publishers. GOOG-DOJ-09559968, at -972 (2020) (Google Network 101 deck).

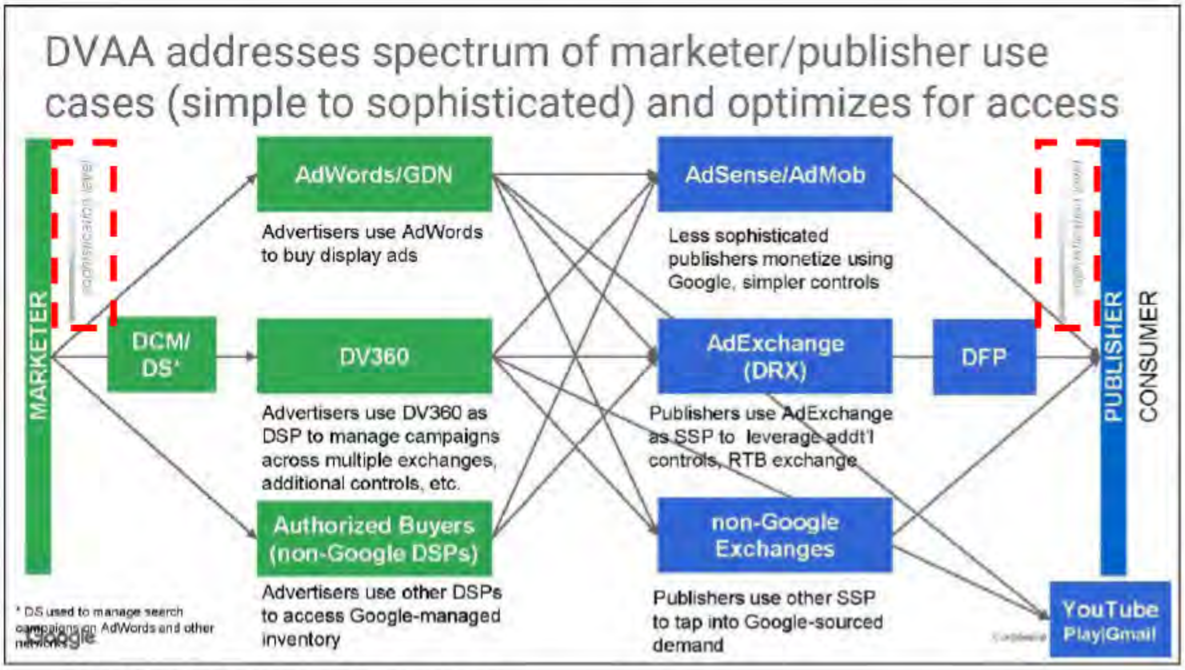
[525] While DSPs tend to be priced on a CPM basis, ad networks can buy CPM and sell on a CPC, CPI, CPA, or CPV basis. GOOG-DOJ-AT-01511990, at -999 (07/09/2020) (Notes from a one-on-one meeting between Google employees George Levitte and Rahul Kooverjee). Google's ad network, Google Ads, is "mostly pay-per-click", while Google's DSP, DV360, is "mostly pay-per-impression." *See* GOOG-DOJ-AT-01130332, at -337 (05/09/2019) (Google Ecosystem Review deck). *See also* GOOG-DOJ-09163024, at -025–026 (10/01/2018) (Google DV360 strategy document).

[526] According to a DV360 strategy document, "Google Ads is for advertisers who can achieve their campaign goals with the scale offered by Google O&O and Network inventory. Display and Video 360 is for advertisers who require additional scale on third party inventory (auction and reservation), and *are willing to pay a premium* to consolidate that inventory together with Google media." GOOG-DOJ-09163024, at -025 (10/01/2018) (Google DV360 strategy document, emphasis added).

[527] Deposition of Eisar Lipkovitz (Google), March 31, 2021, 88:13–90:2.

[528] Deposition of Eisar Lipkovitz (Google), March 31, 2021, 93:19–94:3.

Figure 33. Diagram of Google's DVAA products for "simple to sophisticated" publisher customers



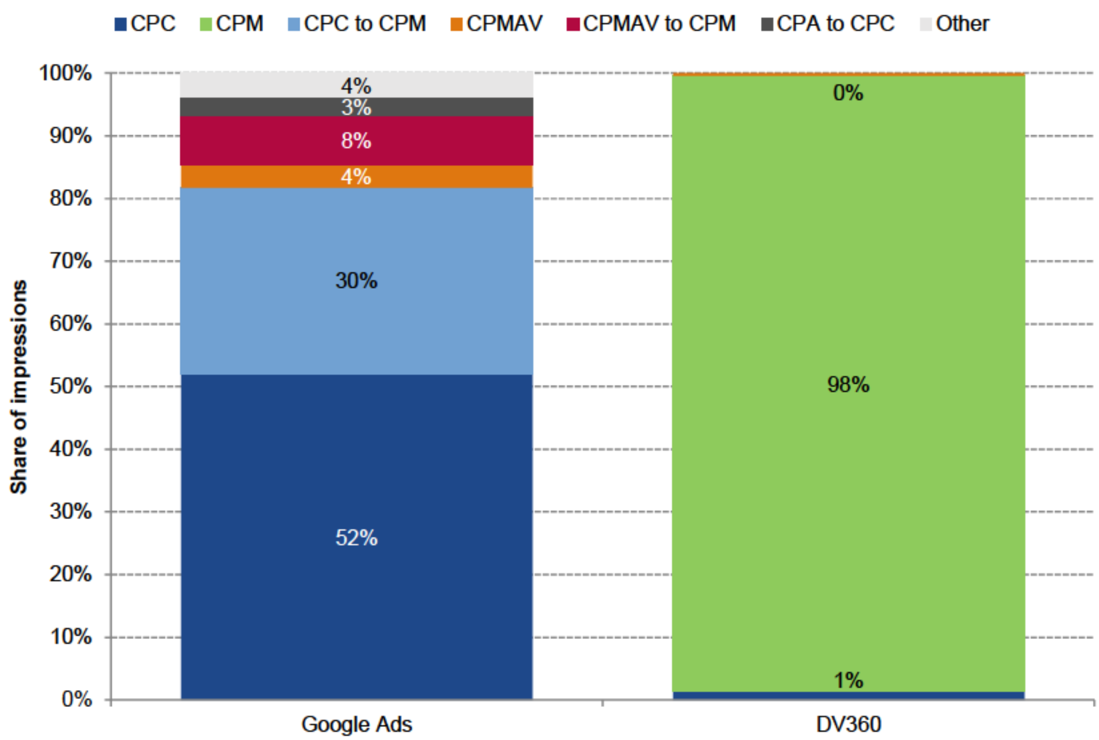
Source: GOOG-DOJ-09559968, at -993 (01/30/2020)
Notes: Red highlighting added.

(365) Next, there is evidence that pricing structures differ between advertiser ad networks and DSPs, as shown in Figure 34 below. Cost types listed in Figure 34 reflect both payments made by advertisers and payments made to publishers. For example, "CPC-to-CPM" represents transactions in which an advertiser paid for an ad slot on a cost-per-click basis, but the publisher was paid out on a per-impression (cost-per-mille) basis. If only one cost type is listed (e.g., "CPM"), then the cost type was the same for the advertiser and publisher. As depicted in Figure 34, over 80% of Google Ads transactions charge advertisers on a CPC basis, while close to 80% of transactions on DV360 charge advertisers on a CPM basis.[529] The differences in cost structures enable advertisers to employ different bidding strategies and achieve different goals.[530]

[529] "CPMAV" means "cost per mille active view" and "CPA" means "cost per action." *See* Google, "Media purchase options on the Display Network," Google Ads Help, https://support.google.com/google-ads/answer/172621?hl=en.

[530] GOOG-DOJ-00221276, at -323 (2018) (2018 GDN Overview deck, "Advertisers who want the tightest control on how they spend" use CPM bidding to "[d]rive impressions" while "Traditional advertisers" use CPC bidding to "[d]rive both website traffic and/or conversions."); GOOG-DOJ-03151263, at -268–269 (n.d.) (Google DBM Optimization deck; Advertisers on Google Ads want "all the clicks they can get for less than maxCPC", while advertisers on DV360 want to maximize "all the impressions they can get for less than maxCPM."). Google Ads focuses on "goal-based buying" while DV360 allows for custom bidding, impression-based buying, and "outcome-based buying." *See* GOOG-AT-MDL-006823531, at -540 and -550 (2022) (Google Ads "focuses on buying to your goals" while DV360 allows advertisers to "[d]efine your own objective") and GOOG-DOJ-02858797, at -806 (09/2019) ("Consolidate Display & Video with Google" document).

Figure 34. Google Ads and DV360 indirect open-web display impressions by cost type (2022)



Source: Google XP data (DOJ RFP 7), Google DV360 data (DOJ RFP 7).
Note: Worldwide share of billable impressions in 2022. Limited to indirect open-web display impressions. I supplement Google XP data with Google DV360 data as cost type information for DV360 is often missing in the Google XP data. Abbreviations: CPC (cost-per-click), CPM (cost-per-mille impressions), CPMAV (cost-per-mille active view), CPV (cost-per-view), CPA (cost-per-action), CPE (cost-per-engagement). *See* Google, "Glossary," Google Ads Help, https://support.google.com/google-ads/topic/3121777?hl=en. "Other" includes CPA-to-CPM, CPV, CPA, CPE, and CPE-to-CPM transaction types.

(366) Lastly, pricing levels between advertiser ad networks and DSPs can differ. For example, a Google document notes: "Why do Google Ads and Display and Video 360 charge different amounts? Google Ads is a broad offering used by a range of advertisers across a diverse base from small businesses to larger brands. DV360 is specifically used by large global advertisers and their agencies to execute complex marketing campaigns, and as such is priced as an enterprise-level solution."[531]

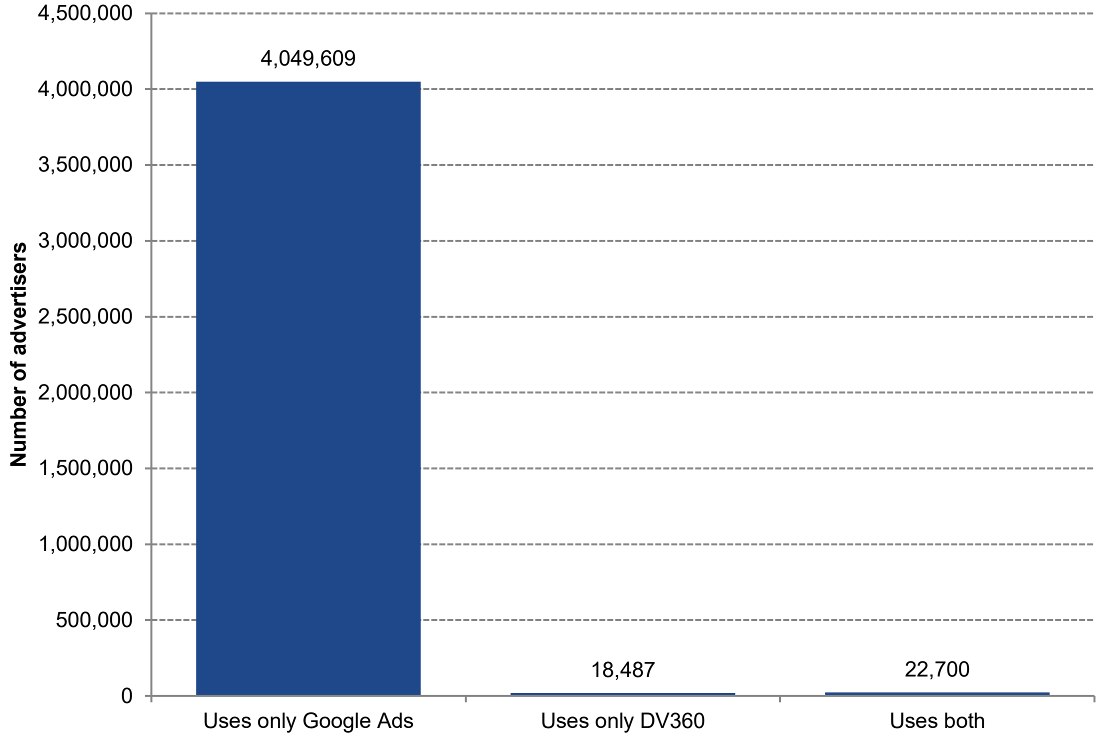
(367) Consistent with the above differences between advertiser ad networks from DSPs, the set of advertisers that use these distinct products differ.

(368) Using Google's data, I analyze the set of advertisers that use Google Ads and/or DV360.

(369) As shown in Figure 35 below, among the advertisers that use either product, the vast majority (nearly 99%) use only Google Ads.

[531] GOOG-DOJ-AT-00038180, at -190 (2020) (Google "Comms Doc"). *See also* Section II.C.4.

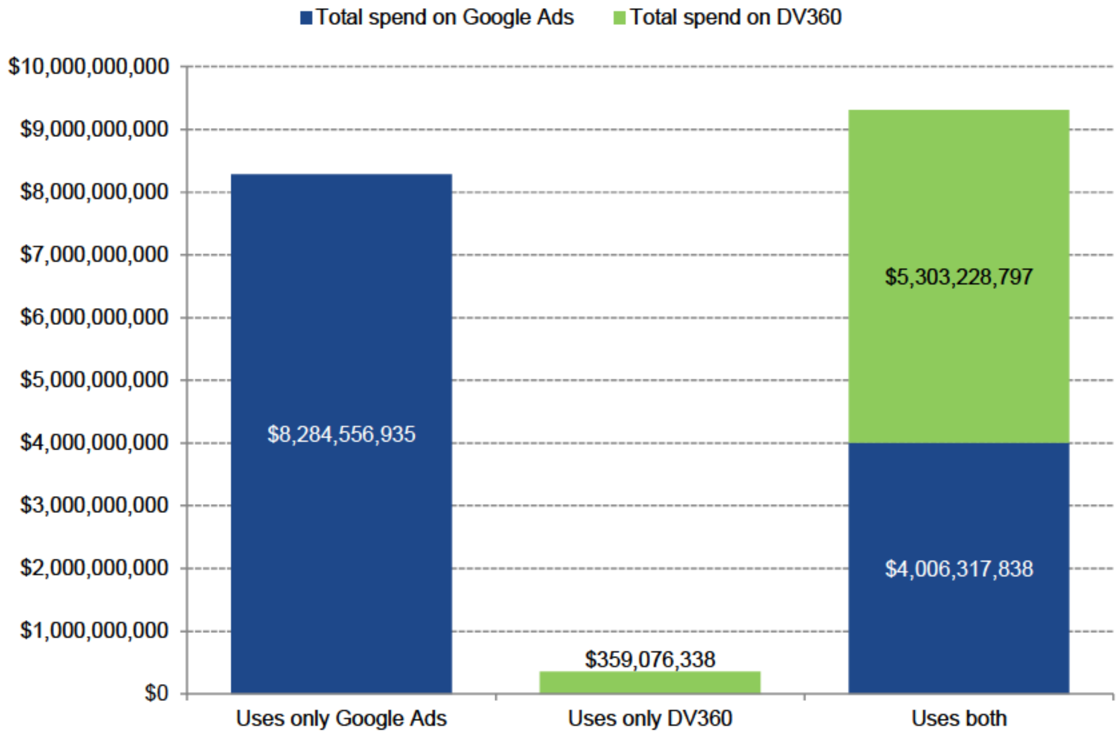
Figure 35. Number of advertisers who used only Google Ads, only DV360, or both (2022)



Source: Google XP data (DOJ RFP 7)
Notes: Figure displays the number of advertisers with positive spending on Google Ads, DV360, or both in 2022.YouTube and mobile app ads, and Programmatic Guarantee and Preferred Deal transactions are excluded. 0.4% of spending on Google Ads is attributed to observations with missing advertiser information, and are excluded.

(370) Despite the large differences in numbers within each group, the total spend represented by the advertisers that use Google Ads and DV360 compared to those that only use Google Ads is roughly comparable, as shown in Figure 36.

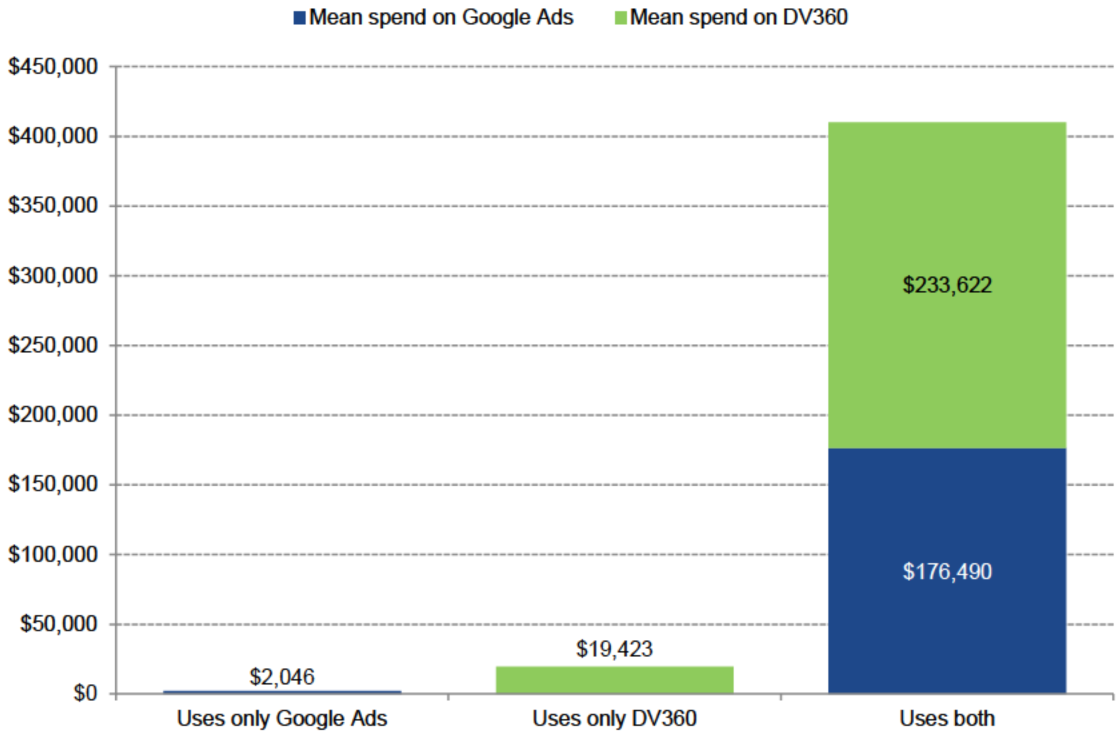
Figure 36. Total advertiser spend on indirect open-web display advertising within Google Ads and DV360 (2022)



Source: Google XP data (DOJ RFP 7)
Notes: Figure displays indirect open-web display spending from advertisers with positive spending on Google Ads, DV360, or both in 2022. YouTube and mobile app ads, and Programmatic Guarantee and Preferred Deal transactions are excluded. 0.4% of spending on Google Ads is attributed to observations with missing advertiser information, and are excluded.

(371) Hence, spending per advertiser by advertisers that use Google Ads is much lower than spending per advertiser by advertisers who use DV360, either instead of or in addition to Google Ads. Figure 37 below shows the average worldwide advertiser spend in 2022 on indirect open-web display advertisements. The figure shows that advertisers who use Google Ads have significantly lower spend than advertisers who use DV360 or a combination of Google Ads and DV360. Note that for those advertisers who use both Google Ads and DV360, a meaningful amount of their spend is through Google Ads.

Figure 37. Average worldwide advertiser spend on indirect open-web display advertising within Google Ads and DV360 (2022)



Source: Google XP data (DOJ RFP 7)
Notes: Figure displays average indirect open-web display spending among advertisers with positive spending on Google Ads, DV360, or both in 2022. YouTube and mobile app ads, and Programmatic Guarantee and Preferred Deal transactions are excluded. The median dollar amounts transacted by advertisers who use only Google Ads, use only DV360, and use both are: $33, $552, and $16,336, respectively. I limit the advertisers in each category to those with positive spend on Google Ads, DV360, or both in 2022, respectively. 0.4% of spending on Google Ads is attributed to observations with missing advertiser information, and are excluded.

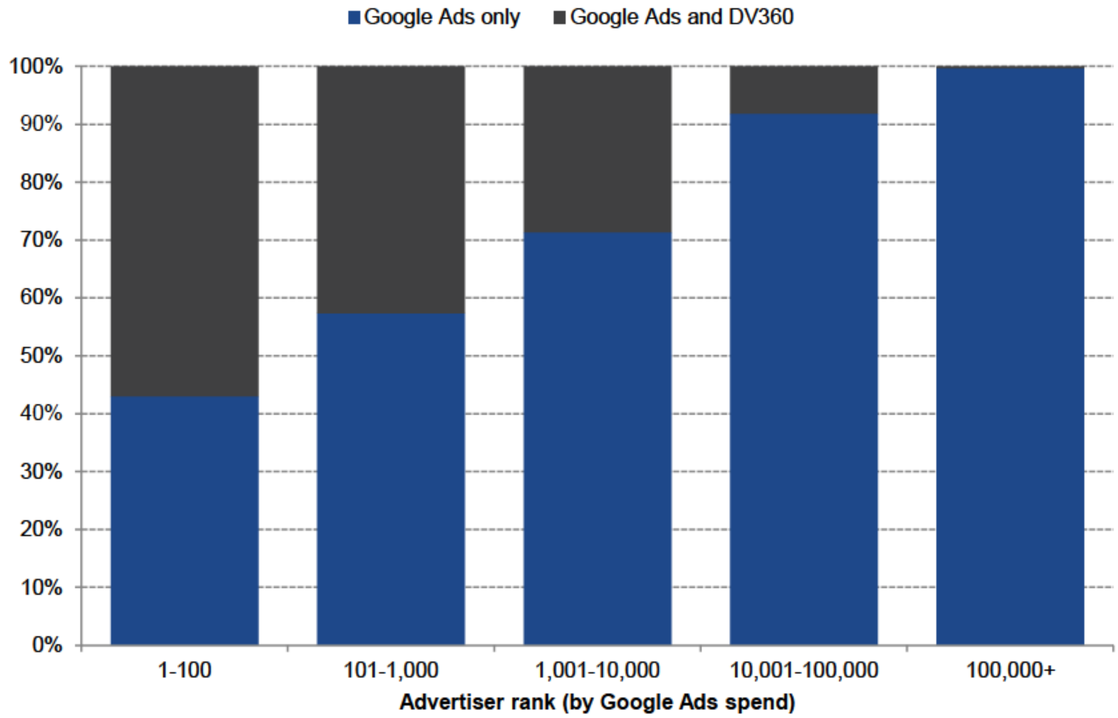
(372) Small advertisers tend to use advertiser ad networks exclusively, whereas advertising agencies and other large advertisers are more likely to (also) use DSPs.[532] Figure 38 shows that among Google Ads advertisers, the smallest advertisers tend to use Google Ads exclusively, whereas as the advertiser size increases, so does the tendency to use DV360 in addition to Google Ads.[533] The figure ranks advertisers based on their total spend on Google Ads in 2022 (i.e., advertisers ranked 1–100 are the 100 advertisers with the most spending on Google Ads in 2022). While more than half of the top 100

[532] A very small advertiser would "have no reason to" use a DSP and that this trend is "not specific to Google," but holds "through and across an entire set of DSPs." Deposition of Eisar Lipkovitz (Google), March 31, 2021, 93:19–94:3 Another Google document specifies that DV360's customers are the "Top 1500 Advertisers globally, Big 6, agencies, DCMPs" while AdWords serves the "Remaining 2M+ customers." GOOG-DOJ-14053654, at -660 (2017) (Google GDN and DBM performance deck).

[533] The top 100 advertisers accounted for 14% of total indirect open-web display spend on Google Ads. Advertisers ranked 101-1,000 accounted for 25% of spend, advertisers ranked 1,001-10,000 accounted for 33% of spend, advertisers ranked 10,001-100,000 accounted for 19% of spend. Over 3.9 million advertisers were not ranked among the top 100,000 Google Ads advertisers, and these advertisers made up only 9% of Google Ads indirect open-web display spend in 2022.

advertisers on Google Ads also used DV360, nearly all of the advertisers outside the top 100,000 had no spend on DV360 in 2022.

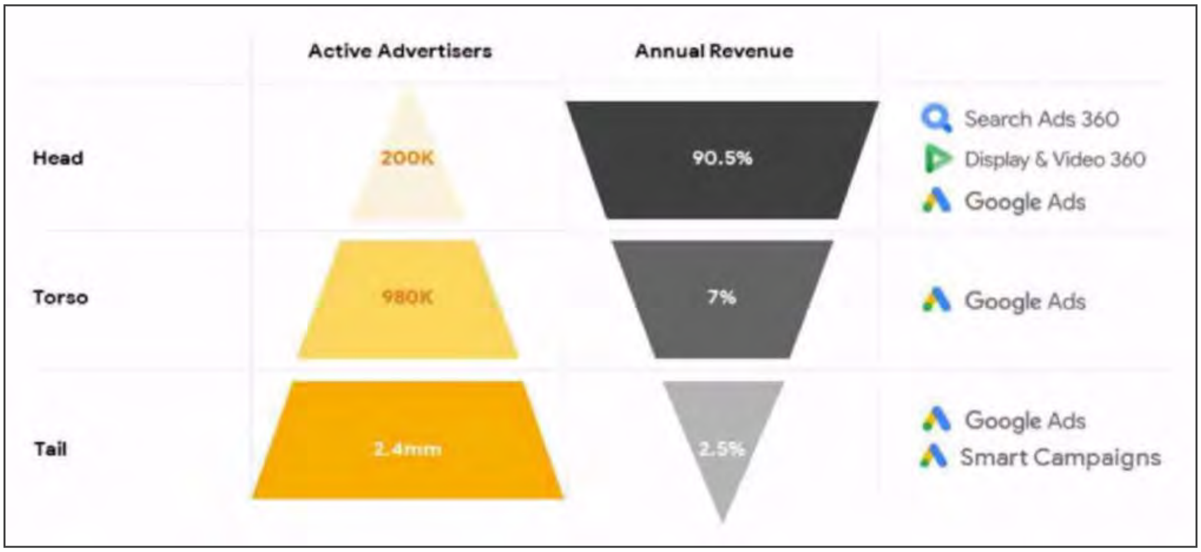
Figure 38. Use of Google Ads and DV360 across Google Ads advertisers, by spending rank (2022)



Source: Google XP data (DOJ RFP 7)
Notes: Figure depicts the (unweighted) share of advertisers using Google Ads only or Google Ads and DV360 in 2022, among groups of advertisers ranked by amount of indirect open-web display spending on Google Ads in 2022. Limited to advertisers with any indirect open-web display spend on Google Ads in 2022. A total of 4,072,309 advertisers are included in the analysis.

(373) A slide from a 2019 internal Google presentation, shown in Figure 39 below, provides further support for the tendency of larger advertisers ("Head" in the figure) to use both Google Ads and DV360, and smaller advertisers ("Tail") to single home on Google Ads.

Figure 39. Head, Torso and Tail advertisers' use of Google Ads and DV360



Source: GOOG-DOJ-03034316, at -321 (Google "Advertiser experience" deck, 2019)
Notes: "Smart campaigns" is functionality within Google Ads. Google, "About Smart campaigns benefits and features," Google Ads Help, https://support.google.com/google-ads/answer/7457632?sjid=8362921333849880277-NA ("Smart campaigns is a Google Ads campaign type that makes it simpler to advertise on Google Search, Google Maps, YouTube, Gmail, and other Google partner websites.").

(374) Indeed, a 2022 Google deck identifies several differentiating factors between Google Ads and DV360—including each having access to unique inventory, audiences, and automation features—and emphasizes the benefits of using both products together, consistent with Ads and DV360 being complements and not substitutes for one another ("Google Ads and DV360: Better Together").[534]

(375) In sum, the above evidence indicates that DSPs are not close substitutes for advertiser ad networks from advertisers' perspectives.

IV.E.1.b. Open-web publishers derive significant value from advertiser ad networks

(376) There is also significant evidence that open-web publishers derive significant value from advertiser ad networks. Advertiser ad networks represent a significant amount of revenue for publishers. According to a Google presentation, in the fourth quarter of 2016, Google Ads buyers made up over 50% of revenue for publishers using AdX, while DV360 and third-party AdX buyers each made up just 23%.[535] Advertiser ad networks such as Google Ads are also important to open-web publishers because of the unique set of advertisers that publishers can access through them that are not available through other products. For example, by using advertiser ad networks, publishers are able to obtain

[534] GOOG-AT-MDL-006823531, at -556–564 (2022).
[535] GOOG-DOJ-04002256, at -265 (2017) (Google Programmatic Update deck).

access to demand from small advertisers that, in the words of a former Google executive, "have no reason" to use a DSP.[536]

(377) As discussed above, analysis of Google data indicates that in 2022, over 99% of advertisers who used Google Ads to purchase indirect open-web display ad inventory did not also use DV360. During that period, these advertisers comprised roughly 47% of all spend on Google Ads.[537] Forgoing advertiser demand coming from advertiser ad networks, such as Google Ads, publishers thus stand to lose access to a substantial unique set of advertising demand that is not accessible via DSPs. As I discuss further in Section VII.B, there is significant evidence that an important reason that publishers used Google's sell-side products DFP and AdX is to access Google Ads' demand.

(378) Last, as discussed in Section IV.B.4, direct deals are also not a substitute for indirect demand provided by advertiser ad networks for publishers.[538] For example, a 2011 Google document noted that small publishers "can't afford to maintain their own sales force and they don't have inventory to be of interest to large advertisers" and "large publishers have inventory that is of too low value to merit direct selling."[539]

IV.E.2. Industry participants recognize that ad networks are distinct products

(379) Industry participants have recognized the distinctiveness of advertiser ad networks, indicating that substitution to DSPs and other ad tech products would likely be limited in response to an exercise of market power by a hypothetical monopolist of competitively-priced advertiser ad networks. For instance,

- Google documents recognize that Google Ads and DV360 serve different sets of advertising customers[540] and that Google Ads customers have fundamentally different needs than DV360

536 Deposition of Eisar Lipkovitz (Google), March 31, 2021, 93:19–94:17 ("Q. Would a very small advertiser ever use a DSP?. . . A. In my opinion, they have no reason to. And, you know, like many of these other companies, and probably including Google, won't even return their phone call, right?. . . If you don't have reason to use it, if you don't use enough volume, it doesn't make sense. I don't think that – that's not specific to Google."); A 2017 Google deck notes that DV360 customers include the "Top 1500 Advertisers globally, Big 6 agencies, DCMPs," the "Remaining 2M+ customers" use Google Ads. If publishers substituted selling inventory through Google Ads to selling inventory through DV360, they would forego access to demand from those 2M+ customers. GOOG-DOJ-14053654, at -660 (2017) (Google GDN + DBM Performance deck).

537 Google XP data (DOJ RFP 7).

538 John Dederick, Executive Vice President at The Trade Desk, testified that compared to publishers who sell inventory only through direct deals, publishers who sell inventory through ad networks get "more of an opportunity to optimize yield which really means … use all of the different supply you have access to to drive up costs and to sell through as much of your inventory as possible." Deposition of John Dederick (The Trade Desk), July 28, 2023, 156:15–157:6; GOOG-AT-MDL-004216796, at -802 (Google Display Advertising Ecosystem document).

539 GOOG-AT-MDL-004216796, at -802 (Google Display Advertising Ecosystem document).

540 A 2019 internal Google memo contains an FAQ section that says Google Ads and DV360 "serve distinctly different customer sets." GOOG-DOJ-02858797, at -807 (09/2019) ("Q: Are there any concerns about using Google Ads & DV360 at the same time? A: The goal for our two platforms is to serve distinctly different customer sets and, serve our individual customer sets with full funnel solutions that meet their needs.") The same memo describes DV360 as building

customers.[541] For advertisers who do use DV360 and Google Ads together, Google documents indicate that these products serve distinct and complementary purposes.[542] A 2022 Google document notes that advertisers can "[u]se DV360 to complement Google Ads' commerce solutions" and lists several "platform differentiators" and "[c]omplementary features" of DV360.[543]

- Google also analyzes the competitive positioning and financial performance of Google Ads separately from DV360. Google identifies distinct sets of competitors for the two products[544] and keeps "significantly different revshares" from transactions through Google Ads and DV360.[545]
- AppNexus distinguishes between advertiser ad networks and other ad tech products, noting that "[t]hrough an ad network, an advertiser can access a desirable set of publisher inventory and buy impressions more efficiently and cost-effectively than would occur in one-off transactions with individual publishers."[546]
- AdPushup, an ad revenue optimization platform for publishers, distinguishes between ad networks and DSPs. It notes that while DSPs offer more advanced targeting features and optimization capabilities, ad networks offer advertisers a simpler, straightforward buying process and broader reach.[547]

(380) In Section VII.B, I provide substantial evidence that industry participants acknowledge that Google Ads (the largest advertiser ad network) provides access to unique advertising demand, and that publishers recognize the value of having access to advertiser ad networks bidding on their display

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"on the strengths of Google Ads to offer additional advanced controls and the ability to buy directly from specific publishers. It is typically used by enterprise customers – both direct advertisers/marketers and agency partners, who expect and utilize granular controls and more customization." *See* GOOG-DOJ-02858797, at -799 (09/2019).

541 GOOG-DOJ-02858797, at -798 (09/2019) ("Consolidate Display & Video with Google" document, 2019).("On the spectrum of increasing advertiser sophistication … there comes a point of discontinuity where the needs of the buyer fundamentally change" and "having solutions in both Google Ads … and Display & Video 360" enables Google to "cater to advertisers with different needs.").

542 GOOG-DOJ-AT-00858505, at -506 (2020) (Google "Future of Display Ad Products" document, 2020). ("Advertiser[s] buy display/video on Google Ads in addition to DV3 to: 1) Save on DV3 platform fees when buying YouTube, 2) Better perceived lower-funnel performance on Google Ads, 3) Access to Google Ads inventory and features.").

543 "Complementary features include Programmatic Guaranteed, ConnectedTV, cross-exchange prospecting, audio, native, 3rd party ad server integrations, and more." GOOG-AT-MDL-006823531, at -574 (2022) (Google Ads and DV360 Playbook for Strategy and Activation deck).

544 GOOG-DOJ-AT-00858505, at -505 (2020) (Google "Future of Display Ad Products" document reads, "GDA and DV3 are positioned differently in the marketplace and do not share the same competition."). *See also* GOOG-DOJ-AT-00221276, at -290 (2018) ("Google Display Network Overview" identifies Facebook (which no longer offers open-web display inventory) as the main competitor to Google's Display Network).

545 GOOG-DOJ-09559968, at -971–972 (2020 (Google "Network 101" deck); *see also* GOOG-DOJ-11890293, at -294 (01/2020) (A Google "2019 Display Highlights" deck summarizes the financial performance of Google Ads and DV360 separately.); GOOG-DOJ-AT-00858505, at -506 (2020) (Google "Future of Display Ad Products" document and "DV360 has worse overall margins.").

546 MSFT-LIT-0000046646, at -664 (10/10/2017) (AppNexus' response to FCA's RFI).

547 AdPushup, "Ad Network vs DSP: What are the Key Differences," https://www.adpushup.com/blog/ad-network-vs-dsp-comparison.

inventory. Indeed, a 2017 Google presentation described Google Ads as providing "[u]nique demand that adds auction pressure to drive greater CPMs, fill and overall yield."[548]

IV.E.3. A hypothetical monopolist of advertiser ad networks would likely charge quality-adjusted prices above competitive levels

(381) A profit-maximizing hypothetical monopolist of advertiser ad networks would likely charge (quality-adjusted) prices that significantly exceed competitive levels. The market power of such a hypothetical monopolist primarily arises from the uniqueness of advertiser ad networks as a buy-side solution for small advertisers, and the publisher demand for access to advertiser ad networks that arises out of the unique demand accessible through them.

(382) As discussed earlier, because advertiser ad networks facilitate transactions between two distinct sets of agents, an exercise of market power requires only that either (a) publishers (or firms representing their supply from the perspective of advertiser ad networks) or (b) advertisers (or firms representing their demand from the perspective of advertiser ad networks) would not substantially substitute away from advertiser ad networks priced above competitive levels. The evidence provided above indicates that substitution by both advertisers and publishers to alternatives would not be sufficient to defeat an exercise of market power by a hypothetical monopolist, and that publishers and advertisers are willing to bear fees significantly above competitive levels to transact display ads through advertiser ad networks.

(383) Moreover, as I will discuss in detail in Section V.D.3, there is direct evidence that Google has been able to exercise substantial market power in the advertiser ad network market with its Google Ads product. For over a decade, Google Ads has been able to charge fees above competitive levels and meaningfully affect publisher payouts by changing its bidding strategies into AdX. Moreover, Google has imposed constraints on Google Ads' ability to bid into third-party ad exchanges to favor AdX, degrading the quality of Google Ads in the process. Google Ads' ability to engage in such behavior strongly indicates that there are limited constraints on the market power a hypothetical monopolist of advertiser ad networks could exercise.

(384) Hence, advertiser ad networks is a relevant product market.

548 GOOG-DOJ-04429792, at -804 (04/2017) ("Monetization Cheatsheet").

IV.F. Relevant geographic markets for publisher ad servers, ad exchanges, and advertiser ad networks

(385) Geographic market definition assists with evaluating monopolization claims by focusing attention on, and explicitly delineating, specific geographic areas where competitive and customer harm can occur.

(386) The focus of this matter is on third-party ad tech products that can be used to transact open-web display advertising. The customers of these third-party ad tech products are open-web publishers and advertisers, and the suppliers of these products include software companies such as Google and its competitors in the relevant product markets.

(387) A relevant geographic market can be based on the locations of customers (buyers or sellers of open-web display advertising). In this report, I focus on geographic market definition based on customer location—i.e., where open-web publishers and advertisers are located—and do not place restrictions on the location of suppliers.[549]

(388) Below, I describe why worldwide (excluding a limited number of regions) is a relevant geographic market for publisher ad servers, ad exchanges, and advertiser ad networks. Customers of ad tech products are located around the world, and transactions between open-web publishers and advertiers occur across country boundaries. Suppliers of ad tech products also have a global presence, and enjoy indirect network effects and scale benefits that are not limited to narrow geographic regions. Moreover, the effects of Google's conduct in the ad tech stack, and restrictions it has placed on the use of its products in the relevant product markets, have been imposed in countries around the world, and are not limited to customers within any single country.

(389) The ad tech industry and scope of Google's conduct is thus global. Although there may be some differences in competitive conditions within narrower geographic regions, there are compelling benefits to examining the whole world when examining the competitive significance and effects of Google's conduct within the relevant product markets.

(390) As a general matter, however, there may be multiple relevant geographic markets that are useful for the evaluation of competitive effects.[550] Below, I also describe why the United States is also a relevant geographic market for these product markets.

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[549] HMG § 4.2 ("The arena of competition […] may be geographically bounded if geography limits some customers' willingness or ability to substitute to some products, or some suppliers' willingness or ability to serve some customers. Both supplier and customer locations can affect this."). The physical location of suppliers is often not relevant for market definition purposes for software products, such as the ones at issue in this case, where customers do not obtain the product at a supplier's location. *See* HMG § 4.2.1 ("Geographic markets based on the locations of suppliers encompass the region from which sales are made. Geographic markets of this type often apply when customers receive goods or services at suppliers' locations.").

[550] HMG § 4.1.1 ("the hypothetical monopolist test ensures that markets are not defined too narrowly, but it does not lead to

(391) In both cases, geographic restrictions are based on the location of customers (advertisers and open-web publishers) that use publisher ad servers, ad exchanges, and advertiser ad networks; and are not based on the location of suppliers (who may be located worldwide).

IV.F.1. A relevant geographic market for all product markets is worldwide (with certain exceptions)

(392) Worldwide, excluding certain countries and regions, is a relevant geographic market, and is appropriate for evaluating Google's market power in each of the relevant product markets and the competitive effects of its conduct. This is for three main reasons.

(393) First, advertisers and open-web publishers that are customers of ad tech products are located in countries located around the world and transact across country and region boundaries. Spending on open-web display is global, with publishers using ad tech products to sell open-web display inventory to advertisers around the world, and advertisers using ad tech products to purchase open-web display inventory from publishers around the world.[551]

(394) For example, Google often reports performance metrics surrounding its ad tech products across three regions—Americas, EMEA (Europe, Middle East, and Africa), and APAC (Asia-Pacific). Figure 40 from a 2018 Google presentation illustrates that although advertiser spending from a region often returns to the sell-side in that region (for example, this is the case for 72% of the spend originating in the Americas), there is a significant share of spending that is spent on the sell-side in other regions.

a single relevant market. The Agencies may evaluate a merger in any relevant market satisfying the test, guided by the overarching principle that the purpose of defining the market and measuring market shares is to illuminate the evaluation of competitive effects.").

[551] GOOG-DOJ-11890293, (01/2020) (Google "Display Highlights: GDA + DV360" deck); GOOG-DOJ-14436571, (06/2019) (Google "Business Forecast Meeting: Sellside" deck); GOOG-DOJ-AT-01592535, at -553 (2018) ("Welcome to the Sell-Side World!"). Criteo also has reported revenues separately by Americas, EMEA, and APAC regions. *See* CRI-00000003, at -011 (12/2018).

Figure 40. Google DVAA customer spending is global

Source: GOOG-DOJ-AT-01592535, at -553 (2018 presentation, "Welcome to the Sell-Side World!")

(395) Furthermore, as I show in the next Section, Google's market power in the relevant product markets is not limited to a single country or region.

(396) Second, aspects of "supply-side" competition among ad tech providers is global. The major competitors in each of the relevant product markets have a presence in multiple geographic regions.[552] Moreover, ad tech products benefit from scale effects—arising from both indirect network effects (as advertiser and publisher customers transact with one another across geographic regions) and data—that are not necessarily restricted to country-specific boundaries.[553]

(397) Third, Google's conduct that I evaluate in this report is not limited to the boundaries of any one country. Google has imposed restrictions on the use of its Google Ads, AdX, and DFP products by open-web publishers and advertisers located worldwide. Hence, the competitive effects of Google's

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552 Data produced by ad tech parties also indicate a significance share of open-web display impressions from publishers located outside of the US. For ad exchanges, over 45% of indirect open-web display impressions transacted by each of AdX, Equativ, Index Exchange, Magnite, and OpenX in 2022 are from non-US publishers (*see* Figure 84 in Appendix C.4). For publisher ad servers, over 65% of open-web display impressions served by each of DFP, Equativ, and Xandr in 2022 are from non-US publishers (*see* Figure 85 in Appendix C.4).

Moreover, for ad exchanges, over 55% of the impressions transacted by each of Equativ, Index Exchange, Magnite, and OpenX were viewed by non-US users (*see* Figure 84 in Appendix C.4).

553 For example, an ad tech product with a worldwide presence can collect data and track users who visit websites operated by publishers that are located in different countries.

conduct extend beyond any individual country's borders, and a worldwide geographic market accounts for this.

(398) To help productively focus attention on areas where Google possesses and exercises market power and where competitive effects of its conduct are most likely to occur, I exclude from the worldwide geographic market the following regions:[554]

- **People's Republic of China**: Chinese regulations that prevent Chinese users from accessing foreign websites and restrict the content that advertisers are able to show have limited the penetration of ad tech products from non-Chinese firms.[555] Google's open-web display presence is limited in China relative to its presence in other countries and regions.[556] Combined with Google's ability to engage in price discrimination, this indicates that a hypothetical monopolist would not likely be constrained in its ability to charge prices above competitive levels in regions outside of China by substitution patterns by advertiser and publisher customers within China.
- **Countries and regions where Google is restricted from operating due to US sanctions**: The US government places restrictions on working with customers in countries and regions that are subject to US sanctions.[557] These restricted areas include Iran, North Korea, Syria, Cuba, Crimea, Donetsk People's Republic (DNR), and Luhansk People's Republic (LNR).[558]

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[554] As I discuss below with regard to a US geographic market, a hypothetical monopolist of any of the relevant product markets would likely be able to engage in discrimination based on customer locations. Hence, even if I were to include these regions within the worldwide geographic market, it would not change my conclusions regarding a hypothetical monopolist's likelihood of profitably charging quality-adjusted prices above competitive levels for customers located elsewhere. Even so, restricting attention to a narrower geographic market has the advantage of not overstating the competitive significance of potential alternatives located in these excluded regions.

[555] Specifically, the Chinese government restricts Chinese users from accessing non-Chinese web domains (i.e., those domains that do not end in ".cn"). As a result, many websites have to create Chinese-specific variants of their sites and advertising content on those sites must link to and use creatives from Chinese domains (GOOG-AT-MDL-011619755, at -755 (05/14/2021) "With upcoming Chinese regulation, all domains served from within Mainland China must be China-specific…If we want to continue to support Web Display in China, we will need to invest in migrating domains, and publishers will need to retag"). *See also* ADOBE-CID30473-0000070266, at -268 (11/22/2019) ("[The Trade Desk is] struggling with the same challenges every other non-Chinese advertising platform faces: approval of every ad by Chinese sensors…, difficulty sharing data, and that brands have a different site behind the Chinese Firewall").

[556] GOOG-DOJ-03597654, at -660 (2019) ("Global Ads Financials Fact Pack Q3 2019", indicating 1.8% of Google Ads revenue in 2018 from China and 46% from US). GOOG-DOJ-14436571, at -597 (06/24/2019) ("Business Forecast Meeting Sell-Side" presentation, indicating LPS within China revenue representing 0.2% of total revenue within display for "Google Network Web" and LPS within US representing 16%.).

[557] Google, "Understanding Google Ads country restrictions," Google Ads Help, https://support.google.com/google-ads/answer/6163740?hl=en.

[558] Google, "Understanding AdSense country restrictions," Google AdSense Help, https://support.google.com/adsense/answer/6167308?hl=en; Google, "Understanding Google Ads country restrictions," Google Ads Help, https://support.google.com/google-ads/answer/6163740?hl=en; Google, "Google Publisher Policies," Google Ad Manager Help, https://support.google.com/admanager/answer/10502938?hl=en.

(399) The exclusion of customers within these excluded regions reflects a very small number of total open-web display transactions and, as a result, their inclusion or exclusion does not affect my opinions.[559]

(400) For the rest of this report, when I use "worldwide," I am referring to all countries and regions excluding those described above.

IV.F.2. A relevant geographic market for all product markets is the United States

(401) The United States is also a relevant geographic market for each of the relevant product markets for examining Google's market power and the competitive effects of its conduct. This is for two main reasons.

(402) First, a hypothetical monopolist of all publisher ad servers, ad exchanges, or advertiser ad networks available to customers (advertisers or open-web publishers) located in the United States would likely profitably exercise market power over those customers, and would not likely be constrained by the prices charged by ad tech products available only to open-web publishers and advertisers that are both located outside of the United States. This is because there is significant evidence that a hypothetical monopolist of each of the relevant product markets would be able to engage in price discrimination based on the location of its customers.[560] Indeed, Google has demonstrated its ability to do so in the relevant product markets:

- For publisher ad servers, Google cites different prices to publishers located in different countries, including the US.[561]
- For ad exchanges and advertiser ad networks, Google is able to dynamically adjust the fee on its AdX and Google Ads products across publishers, and even in some cases within publisher across impressions.[562]

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559 Among all exchanges for which I have data, only AdX and AdSense Backfill provide country- or region-level granularity for publisher or advertiser locations that allows for these restrictions. In 2022, less than 0.1% of AdX open-web display impressions were from publishers reported to be within these excluded regions (Google AdX data (DOJ RFP 53)). For AdSense Backfill, roughly 0.1% of 2022 open-web display impressions were from publishers within these excluded regions (Google AdSense Backfill (DOJ RFP 7)). For DFP, in 2022 less than 0.1% of open-web display transactions were from publishers reported to be located within these excluded regions (Google DRX Internal Stats data). For Google Ads, in 2022, there were no open-web display impressions from advertisers reported to be located within these restricted regions (Google Ads aggregate data (DOJ RFP 54)).

560 HMG § 4.2.2 ("When the hypothetical monopolist could discriminate based on customer location, the Agencies may define geographic markets based on the locations of targeted customers.").

561 *See, e.g.*, "Google Responses to DOJ Ad-Tech Data Follow-Up Questions (July 10, 2020)"; "Appendix A – Corrected sell-side rate card – HIGHLY CONFIDENTIAL.xlsx." *See* Section II.D for a discussion of fees in the ad tech stack.

562 For AdX, *see* GOOG-AT-MDL-006217592, at -593, (Google's response to the European Commission's RFI 10,"Dynamic Revenue Share provided the flexibility for publishers to accept a lower revenue share in some auctions, if other auctions transact at a correspondingly higher revenue share.") and GOOG-AT-MDL-009045058, at -063 (08/04/2021) (A document by AdX's Rita Ren which records that: "DRS under first-price was implemented and experimented with during 2020Q3-Q4. The experiment result showed ~$100M ARR"). For Google Ads, *see*: GOOG-

(403) Google's ability to engage in price discrimination and charge different prices to customers without being constrained by customer substitution implies that a hypothetical monopolist could also engage in a targeted exercise of market power over customers within a particular geographic region.

(404) Hence, a hypothetical monopolist of all products within a relevant product market would likely be able to exercise market power over US customers—and in particular, US open-web publishers—without being constrained by the prices charged for ad tech products only available to customers located outside of the United States.

(405) Second, the competitive effects of Google's conduct are likely to be particularly meaningful within the United States. Although (as noted above) Google often reports display advertising metrics across three broad geographic regions (Americas, EMEA, APAC), Google also often reports metrics at the US level as well.[563] There is evidence that the United States represents a meaningful share of Google's revenues from web display advertising.[564] For example, in 2022, 31% of impressions and 45% of spend from open-web display indirect transactions on AdX originated from publishers located in the United States.[565] Similarly, in 2022, advertisers located in the United States accounted for 35% of impressions and 58% of spend from open-web display indirect transactions on DV360.[566] The US also represents a large share of open-web display impressions for many of the major competitors in the relevant product markets.[567]

AT-MDL-006218271, at -284–285 describing Project Bernanke, which varied the take rate targeted by Google Ads across impressions and publishers ("Under the initial version of Bernanke, Google Ads targeted an average take rate on a per publisher basis. Under Global Bernanke, launched in 2015, Google Ads targeted an average take rate across all publishers, but allowed the target take rate to vary to an extent for individual publishers."; "Google Ads DRS [a predecessor of Project Bernanke] was launched in January 2013 to allow Google Ads to dynamically adjust the take rate it targetd, depending on the competitiveness of the AdX auction."). *See also* GOOG-DOJ-AT-02471194, (07/26/2015) ("Global Bernanke is an extension of project Bernanke in which GDN retains a 15% margin on AdX as a whole, while deviating from 15% on individual publishers."). *See also* discussion of dynamic reserve price optimization (RPO) for AdX in Section V.C.3.

563 *See, e.g.,* GOOG-DOJ-03597654, at -664 (2019) (Global Ads Financial Fact Pack, Q3 2019), GOOG-DOJ-AT-00288371, at -373 (2020) (Global Ads Financials Fact Pack, Q2 2020), GOOG-DOJ-14436571, at -597 (06/2019) (Business Forecast Meeting, Sell-Side); *see also* GOOG-DOJ-04407255, at tab ">>>Desktop Display Ads" (Industry Metrics – Advertising Fact Pack, September 2012, at tab ">>>Desktop Display Ads," which breaks out "Desktop Display Ad spend" for the United States).

564 *See also* GOOG-DOJ-04407244, at -664 (2019) ("Industry Metrics - Advertising Fact Pack, Global Business Strategy, September 2012," From 2008-2012, the US comprised the largest ad spend on Google's desktop display advertising of any country listed); GOOG-DOJ-03597654, at -664 (2019) ("Global Ads Financials Fact Pack Q3 2019," US representing 41.8% of Google Ads global display revenue and the largest of any country or region listed); GOOG-AT-MDL-008574604, at -612 and -620 (01/2021) (Google GDA Overview deck, January 2021,"Regionally we see the majority of revenue in the Americas, with US contributing 44% of revenue." US and Canada contributes more to revenue from display campaigns than any other region.); GOOG-DOJ-14436571, at -597 (06/24/2019) (Google Business Forecast Meeting deck) (In 2019, over half of all sell-side revenue from Google's LPS publishers was from US inventory).

565 Google AdX data (DOJ RFP 53).

566 Google DV360 data (DOJ RFP 7).

567 For ad exchanges, over 15% of 2022 indirect open-web display impressions transacted by each of Index Exchange, Magnite, and OpenX are from US publishers (*see* Figure 84 in Appendix C.4). For publisher ad servers, over 20% of 2022 open-web display impressions served by each of DFP, Verizon, Equativ, and Xandr are from US publishers (see

(406) For these reasons, the US is also a relevant geographic market for the purposes of analyzing Google's market power and the competitive effects of its conduct.

Figure 85 in Appendix C.4).

(426) Fifth, Google has access to valuable data, both from its extensive consumer-facing services and from DFP IDs, which it uses to offer advertisers the ability to target their ads.[603] According to industry participants, Google's data provides it with substantial advantages in the ad tech stack.[604]

V.A.2. Economic factors that increase barriers to entry and expansion

(427) Particular economic features of the ad tech stack amplify the value of Google's strategic assets and create barriers to entry and expansion for potential and existing competitors. These features include:

- **Indirect network externalities.** As discussed in Section III.D.1, products in the open-web ad tech stack exhibit indirect network externalities. For example, a successful ad exchange requires enough desirable display inventory to attract buyers to its auctions and enough attractive demand to induce publishers to supply their impressions. As I discuss further in Section VII.C, publishers value the unrestricted real-time access to Google Ads demand through AdX that is provided via

[603] GOOG-DOJ-05782415, at -460 and -013–014, ("The primary IDs used by Google for ad targeting purposes are: Google User IDs, pseudonymous unique IDs stored in advertising cookies, and mobile advertising IDs." Google User IDs are "data tied to a user's Google Account identity" and pseudonymous unique IDs are "unique IDs stored in cookies.").. *See also* Section III.D.3 and Section V.B.1. Google also collects large amounts of data via its web tracking and analytics services, primarily Google Analytics. In a study crawling the top 1 million websites, Google Analytics third-party trackers appeared on about 70% of sites. Steven Englehardt and Arvind Narayanan, "Online Tracking: A 1-million site Measurement and Analysis," Proceedings of the 2016 ACM SIGSAC Conference on Computer and Communications Security, 1388–1401, https://dl.acm.org/doi/pdf/10.1145/2976749.2978313. *See also* GOOG-TEX-01003668, at -697, -702, and -704 (Google presentation by Ronan Harris, VP & UK Managing Director, Google that states "Google has more data, of more types, from more sources than anyone else. And we use the best data science to answer questions for consumers a trillion times a year. This same data technology and expertise enables us to find better answers to your marketing and business problems" and "Our platforms allow marketers to: find more customers – more (qualified/relevant/potential) customers, among the largest most engaged audiences through SIGNALS amongst all potential customers at SCALE -across multiple platforms (Search, GDN, DBM, YouTube), Across every device." and "Google is a big part of this scaling machine with massive reach across the internet. We now have over a billion users on 7 of our properties…and you also have the full DoubleClick stack to take advantage of."). *See also* GOOG-AT-MDL-004522085, at -089 (02/2017) ("Today, we have 7 consumer properties that users love and over 1B signed-in users – Google Play, Android, Gmail, Maps, YouTube, Chrome and of course, Google.com… And from user interactions with these products, we can begin to understand their needs, their intents, their behaviors in a way no other company can.").

[604] *See* Section III.D and Section V.B.1 for additional discussion of the importance of data for targeting. *See also* Deposition of John Dederick (The Trade Desk), July 28, 2023, 170:13–172:7 ("Q. Do you view the success of Google's DV360 as being based on DV360 being the best product? …A. There are numerous independent technology reports that have showcased what our clients also say to us, which is that Google's DV360 DSP is inferior to The Trade Desk as a product, as a service team, and there are hundreds of ways that that plays out across the product. And yet, we hear from our customers constantly, I'm sorry, I can't work with you, I can't give you that budget, you lost that budget to Google, not because they have a superior platform or superior technology or superior service, but because of the advantages that were promised. And those advantages are exclusive access to huge pools of inventory that every buyer has to have, any massive and authenticated audience that has signed up for Google properties, Gmail, Maps, Google Chrome. There are billions of registered users whose data are being monetized to drive more revenue to Google properties. And so, it's that, it's the exclusive access to huge pools of inventory and the data asset that's come from all of the logged in users across Google and associated metadata.") and Deposition of John Gentry (OpenX), October 26, 2023, 41:1–41:22 ("Q. What competitive advantages, if any, does AdX have when competing against OpenX? A. One would be the enormous amount of demand that it gets from being owned by Google. So it's getting proprietary access to Google demand. The other would be the knowledge that it gets from Google's ownership of the ad server and the ability for Google to use their knowledge of the ad server, their knowledge of bid prices, their knowledge of winning bid prices to inform AdX bidding strategy.").

uses significant amounts of historical data from within the ad tech stack to forecast future traffic volumes and to dynamically set reserve prices (i.e., price floors) across exchanges within DFP.[622]

V.B.2. Indirect evidence of Google's market power in the publisher ad server market

(436) Google's high market shares, as well as evidence of significant barriers to entry, provide indirect evidence of Google's substantial and sustained market power in the publisher ad server market.

V.B.2.a. Market shares

(437) In this section I show, both using documents and data, that Google has maintained a very high market share in the publisher ad server market for an extended period of time.[623]

(438) First, multiple Google documents since 2018 estimate DFP's market share across various measures at roughly 85–90%, and identify few competitors in the publisher ad server market.[624] Figure 41 below, sourced from a November 2020 presentation on Google's Display Business, notes that Google Ad Manager (GAM), made up of DFP and AdX, is "critical to many of the world's largest publishers," and that "85% of 'display web' addressable inventory flow[s]" worldwide through GAM.[625]

622 *See* Section III.D.3 for further details.

623 For some of the Google documents that report DFP market shares in this Section, it is not clear whether the calculation reported includes direct, indirect, or both sets of transactions that DFP serves; or if there is a geographic restriction. Nonetheless, the documents that I present all indicate DFP possesses high shares for a given set of transactions. Later, when I present estimates of DFP's market share using data produced on this matter, I will present market shares based on both direct and indirect transactions, and for worldwide and US user-based impressions.

624 *See, e.g.*, GOOG-DOJ-03070314, at -314 (05/10/2018) (Google "Audience story for Telco" deck states, "For the past couple of decades, DFP has been the ad server of choice for pretty much all publishers for display. 90% market share."); GOOG-DOJ-03227244, at -252, -272 (06/24/2019) (Google Sell-side Business Forecast Meeting deck estimates Google's global non-weighted web platform penetration, calculated as "breadth of top 2/3 of the addressable market," to be 85%, and Google's weighted average penetration to be ~91%. The slide deck defines "Web DFP Penetration" as "# domains with DFP tag or adsense hardcoded or Yavin impelmentation / # domains addr. running ads (nonweighted Breadth)").

625 GOOG-DOJ-AT-00855803, at -807 (11/2020) (Google Display Business Overview deck).

Figure 41. November 2020 Google presentation showing the global scale and reach of Google's DFP and AdX products

Source: GOOG-DOJ-AT-00855803, at -807 (11/2020).

(439) Other Google documents point to a similarly large presence of DFP. An internal Google strategy document from 2018 states that GAM, including DFP, has a web penetration of the top 5,000 domains of "84% (breadth) and 66% (depth)."[626] In a 2018 deck, Google designates its owned-and-operated properties and Facebook and Amazon as part of the "unaddressable" segment of the web for its sellside display business (see Figure 42 below), reflecting that this web inventory is not available to third-party ad tech products.[627]

[626] GOOG-DOJ-04004392, at -396 (09/10/2018) (Google publisher strategy document). When discussing DFP web penetration, Google defines "breadth" as the percentage of addressable domains running ads that use DFP. "Depth" refers to the percentage of impressions from addressable domains that are served by DFP.GOOG-AT-MDL-001263326, at -327 and -341 (08/2018) Google presentations defined "addressable" web inventory as sites that "are addressable by Google Display Sales teams (excludes terminated or blacklisted sites)" and distinguish between "addressable, not running ads" and "addressable, running ads." GOOG-AT-MDL-007348297, at -344 (03/24/2021); GOOG-AT-MDL-001263326, at -327 and -341 (08/2018); GOOG-DOJ-04442323, at -350 (03/24/2021). Addressable inventory includes web display inventory on open-web publishers that can be sold using third-party ad tech products.

[627] GOOG-DOJ-04442323, at -350 (02/08/20108) (Google Sellside Monetization and Search Distribution QBR deck notes that "`Other' unaddressable incl. Blacklisted sites (e.g. adult, gambling), other Competitors… Adult, Goog, YT, FB, Amzn, are not addressable."). See previous footnote for definition of "addressable" inventory.

Figure 42. Google presentation showing unaddressable and addressable web inventory

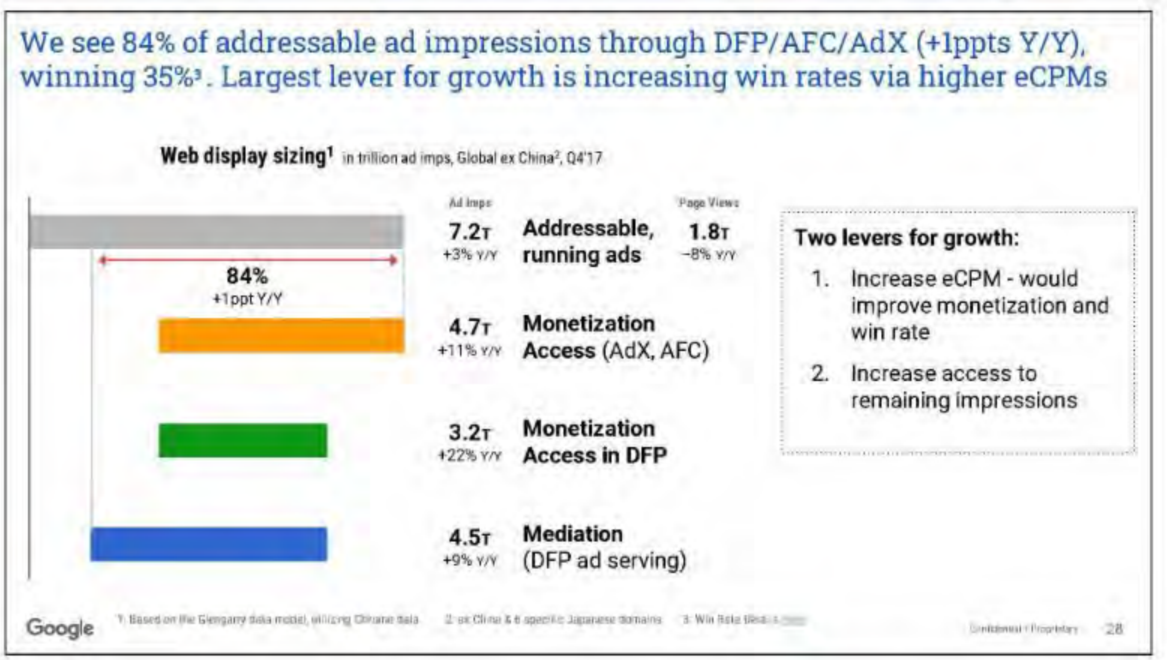
Source: GOOG-DOJ-04442323, at -350 (02/08/2018) (Google Sellside Monetization deck).

(440) Among the "addressable" segment of the web, containing open-web publishers that could in theory be served by DFP or competing third-party ad servers, the presentation notes that Google focuses on those that are running display ads as the "Competitive market for Ad Monetization."[628] Figure 43 below, a slide from this same deck, notes that Google "see[s] 84% of addressable" global (excluding China) web display ad impressions through DFP/AFC/AdX, with 62.5% served through DFP.[629]

[628] GOOG-DOJ-04442323, at -350 (02/08/2018) (Google Sellside Monetization and Search Distribution QBR deck).

[629] The slide focuses on 1.8T page views (converted into 7.2T impressions) on publishers Google designated as "addressable, running ads," labelled as the "[c]competitive market for Ad Monetization." GOOG-DOJ-04442323, at -350–351 (02/08/2018).

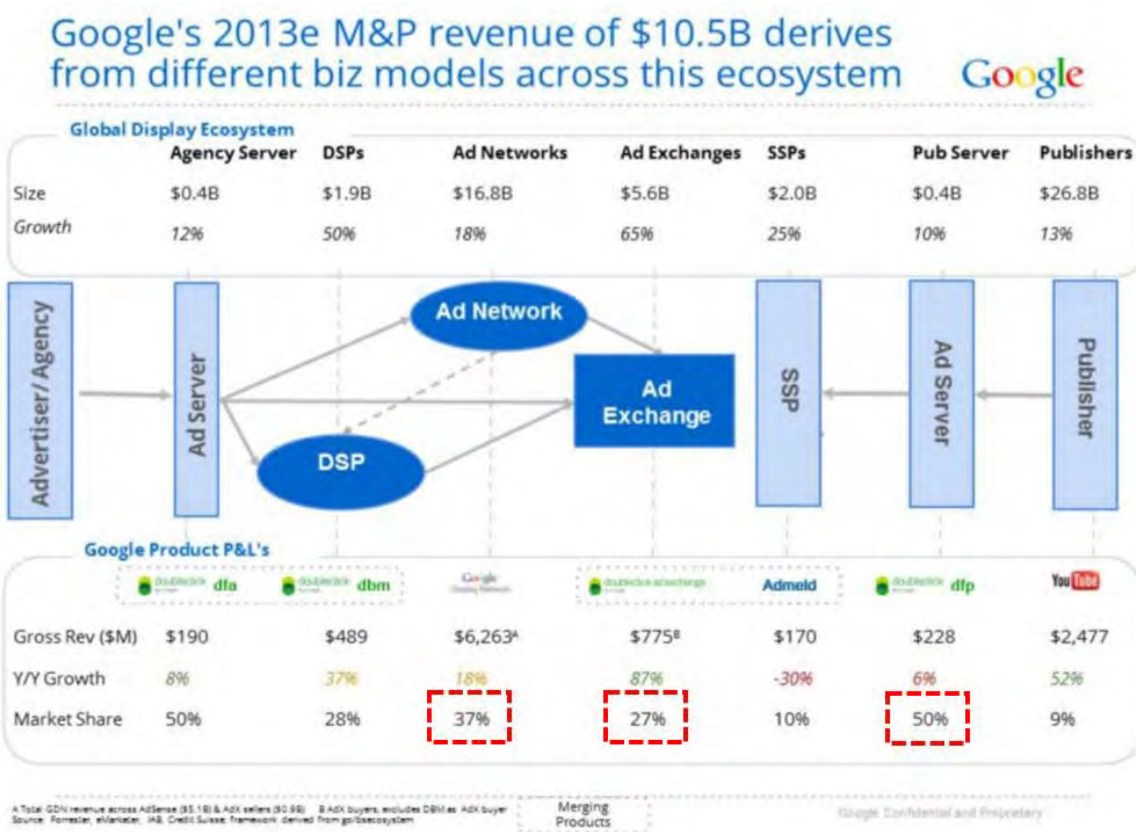
Figure 43. Q1 2018 Google presentation showing DFP's share of addressable web display ad impressions



Source: GOOG-DOJ-04442323, at -351 (02/08/2018) (Google Sellside Monetization deck).
Notes: The blue, green, and orange bars above show that Google sees 84% of all addressable web display impressions on advertisers running ads. While 62.5% of those impressions go through DFP (the blue bar), the other 37.5% still go through AdX or AdSense (the portion of the orange bar that does not overlap with the blue bar), leaving only at most 16% of impressions served on non-Google exchanges through third-party ad servers.

(441) Even as far back as 2013, Google reported that DFP had a global market share of 50% among publisher ad servers with positive growth (see Figure 44 below from a May 2013 Google presentation). Hence, Google has likely maintained a market share of 50% or greater in the publisher ad server market for more than a decade, with the share having grown over time.

Figure 44. Google reported DFP's market share at 50% in 2013



Source: GOOG-DOJ-04445011, at -014 (05/2013) ("Google 2013 Global Media & Platforms Business Update deck")
Notes: Red highlighting added.

(442) In addition to Google's analyses, other industry participants have also noted DFP's very high share in the publisher ad server market. [redacted] John Dederick, Executive Vice President at The Trade Desk, testified earlier this year that "Google's DFP is far and away the dominant publisher ad server."[631] Recent deposition testimony from another ad server provider estimated that "over 90 percent or more of publishers are using GAM."[632]

[630] FBDOJGOOG_00028978, at -992–993, (02/2018) (Facebook noted in its 2022 forecast, "Tl;Dr Google is going to dominate").

[631] Deposition of John Dederick (The Trade Desk), Jul. 28, 2023, 153:25–154:2 ("Q. Which company has the largest publisher ad server? A. Google's DFP is far and away the dominant publisher ad server.").

[632] Deposition of James Avery (Kevel), August 16, 2023, 43:14–43:20 (Q. And why do you view Google's publisher ad server GAM as being a monopoly in the publisher ad server market? . . . A. I think they have – they have over – you know, over 90 percent or more of publishers are using GAM.").

(443) My analysis of data provided in this matter also corroborates DFP's large share of open-web display impressions served.

(444) Because open-web publishers usually choose at most one publisher ad server for their direct and indirect display advertising needs,[633] publishers will typically value a publisher ad server's ability to serve both of these types of transactions. Hence, I compute market shares based on all impressions served.

(445) Figure 45 below shows the monthly total number of worldwide open-web display impressions served by a set of publisher ad servers for which I have data.[634] I conservatively include a broader set of impressions from certain third-party publisher ad servers that do not provide sufficient data to isolate open-web display transactions (which understates DFP market share among this set of products).[635] In 2022, DFP served approximately 91% of total worldwide open-web display impressions among this

[633] *See* discussion in Section III.C, fn. 246.

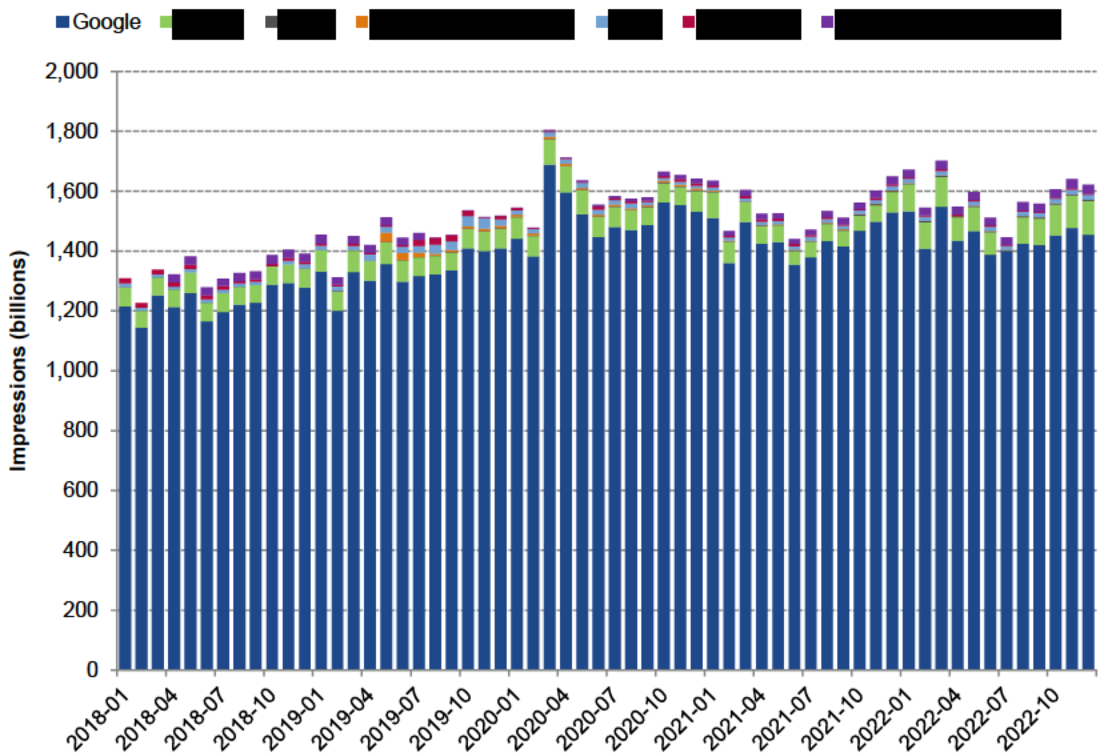
[634] I obtained publisher ad server data from Google, Equativ, Xandr, Verizon (for their One Ad Server), Kevel, FreeWheel, and BrightRoll ("BRX-D"). I do not have data from other publisher ad servers, but have not seen information that indicates that inclusion of impressions from other third-party publisher ad servers would significantly reduce DFP's market share of open-web display impressions among worldwide or US publishers. A set of non-DFP publisher ad servers including Adform and EPOM are "miniscule" in size compared to GAM, according to an executive from a third-party publisher server. Deposition of James Avery (Kevel), August 16, 2023, 89:14–89:19. I am aware of a product named SAS ad server; the information I have reviewed does not suggest it has a meaningful US or worldwide presence as a publisher ad server for open-web display advertising. According to Todd Parsons, Chief Product Officer of Criteo, Criteo has a publisher ad server called HookLogic that "focused on retail publishers" that "are looking to participate in retail media and commerce media" with "sponsored product listings" and advertisements served on the retailer websites. Deposition of Todd Parsons (Criteo), September 8, 2023, 203:22-206:16. ("Q How does the number of customers that Criteo has for its publisher ad server compare to the number of customers that Google has for its publisher ad server? A Much smaller. Much, much smaller. Q Do you have a sense of the order of magnitude how much smaller the number of customers for Criteo's publisher … ad server are? A I don't. [] I'm speaking about what I believe to be much smaller because, in our world, the ad server that I'm [] talking about is specific to retail media. So we don't maintain a competitor to Google Ad Manager.") Consistent with this description of HookLogic focusing on retail publishers, a 2020 Google "Product and Business Strategy" document lists "Criteo Sponsored Products (fka HookLogic)" as competition under "Commerce (Sponsored Products)" (GOOG-DOJ-09183023, at -30).

[635] Due to limitations in certain third-party publisher ad server data, in some instances I am unable to restrict the data to open-web display impressions. When this occurs, I conservatively include a broader set of impressions from third-party publisher ad servers (see figure notes for Figure 45). I describe my data processing in more detail in Appendix H. While Kevel, FreeWheel, and BRX-D can facilitate the serving of open-web display ads, they each have a focus on non-display advertising. Kevel builds ad servers for publishers with a focus on native advertising (Deposition of James Avery (Kevel), August 16, 2023 at 15:02–15:05), while both FreeWheel and BRX-D focus on instream video advertising (EQUATIV-000000091 "[FreeWheel is] [s]trong on Video and CTV but not a generalist;" DOJ_Google Templates - Confidential (v2).xlsx (BRX-D took over programmatic ad serving from the One Video ad server)). Due to data limitations, I make the following assumptions when incorporating the relevant set of transactions from these products. For Kevel, I am unable to distinguish within Kevel's data which transactions are non-native display. As noted above, to be conservative, I include all of Kevel's transactions in my market share calculations, even though this understates DFP's market share. While FreeWheel data does not allow me to distinguish between instream and outstream advertisements, I include all of FreeWheel's transactions to be conservative, but exclude impressions that are served on TVs (as I note in Section II.A, instream video advertisements are shown on TVs). Note that the remaining FreeWheel impressions likely include a large number of instream video ads served on web.

My market share calculations exclude impressions that DFP serves from Google-owned properties.

set of publisher ad servers; DFP's 2022 share of open-web display impressions from US publishers is approximately 87% among this set.[636]

Figure 45. Worldwide open-web display impressions served by publisher ad servers (2018–2022)



Source: Publisher ad server panel (*see* Appendix H).
Notes: 1. Limited to open-web display impressions on mobile and desktop devices (includes house ads). 2. [redacted] data do not contain information on device type, transaction type, ad type, instream/outstream or mobile channel. Since the data do not allow me to identify open-web display impressions, I conservatively include all [redacted] impressions. 3. [redacted] data do not distinguish between ad types; hence, I conservatively include all [redacted] ad types. 3. [redacted] data do not distinguish between instream and outstream video ads; I conservatively include all [redacted] video impressions, excluding impressions served on TVs for [redacted] 4. Due to issues with the reported data, [redacted] data is missing in July 2022; [redacted] data is missing in May, July, and November of 2018; [redacted] data is unavailable prior to May 2019; [redacted] data is unavailable prior to April 2018; [redacted] data is missing in October 2018 and April 2022.

V.B.2.b. Barriers to entry and expansion

(446) Competitive entry into the publisher ad server market to an extent that would challenge the dominance of Google's DFP would be extremely difficult.

[636] *See* Figure 108 in Appendix D.4. These open-web display impression market share calculations include house ads. Excluding house ads, from 2018 through 2022, DFP maintained a greater than 69% share of *direct* open-web display impressions and 88% share of *indirect* open-web display impressions worldwide among this set of publisher ad servers. (Transaction type information is unavailable in all periods of the Equativ and Kevel data, and for certain transactions in the BRX-D and Xandr data. When these data are missing transaction type information, I conservatively include all of the impressions when calculating market shares without house ads among direct or indirect transactions for DFP.).

switched to DFP in large part because DFP was the industry standard "that many publishers were using and agencies and advertisers were familiar with."[644]

(450) Beyond Facebook and the New York Times, a number of firms have struggled with their publisher ad server offerings in recent years. For example, OpenX closed its ad server product in 2019,[645] and Verizon announced in 2019 its plans to shut down its Oath ad server in 2020.[646]

(451) Barriers to entry and expansion in the publisher ad server market include:

- **Costs of building and maintaining a publisher ad server**. Building a new publisher ad server and accompanying publisher relationships requires substantial investments.[647] A Facebook internal analysis cited costs of "multiple billions of dollars" over "3-5 years" requiring "500-1000 staff" to "[b]uild publisher tools and relationships" in the ad tech stack.[648] An executive from Disney said that building the proprietary Disney Ad Server to facilitate their instream video advertising took approximately two years, required "200 to 250 people," and cost "in excess of $100 million" to develop.[649] The Disney executive noted that there are also substantial maintenance costs to running an ad server on the order of "about $200 million a year" even after its development.[650]
- **Switching costs.** Publishers tend to use a single publisher ad server for web display advertising, and thus gaining share in the market means convincing publishers to switch ad servers. As

644 Deposition of James Glogovsky (New York Times), August 25, 2023, 143:3–144:10

645 Chris Shuptrine, "OpenX Ad Server Alternatives," *Adzerk*, December 19, 2018, https://adzerk.com/blog/openx-ad-server-alternatives/.

646 Tyrone Stewart, "Verizon Media to shut down ad server," *Mobile Marketing Magazine*, May 3, 2019, https://mobilemarketingmagazine.com/verizon-media-oath-ad-platforms-shut-down-2020.

647 Deposition of Eisar Lipkovitz (Google), March 31, 2021, 114:11–114:25 ("Q. Does the ad server business have substantial fixed cost? A. Yeah, I think it is – you know, the biggest one is probably the technology R&D team, right, and payroll for that.").

648 *See* FBDOJ003286815, at -824 (02/28/2018). *See also* FBDOJ003260796, at -802 (02/05/2018) ("Huge engineering investment to build competitive feature set to DFP for head of market publishers… 5-10 year roadmap to drive meaningful adoption."). *See also* Chris Shuptrine, "The Hidden Costs of Building Your Own Ad Server," *Kevel*, April 15, 2021, https://www.kevel.co/blog/build-ad-server-hidden-costs/ ("We have yet to see a company who decided to build from scratch then release their ad platform on time, and most end up never actually launching one" because "[e]ven with a team of 5-10 engineers... building an ad platform from scratch with all these features would take years (at least, it did for Google, Facebook, and others, who had much larger teams than that).").

649 *See* Deposition of Jeremy Helfand (Disney), September 29, 2023, 113:12–114:6 ("Q. How long did it take to build the Disney Ad Server? A. It took approximately two years. Q. How much -- how many people worked on the project to build the Disney Ad Server? A. Few hundred people. Q. Approximately 200? 300? A. Probably somewhere around 200 to 250 people, I would say. … Q. Approximately how much did it cost to develop the Disney Ad Server? A. It cost in excess of $100 million to develop the Disney Ad Server.").

650 *See* Deposition of Jeremy Helfand (Disney), September 29, 2023, at 121:1–16 ("Q. Okay. Do you have kind of an all-in number for how much it costs Disney to maintain the ad server each year?...A. Our -- our total -- our total budget for my organization, which is responsible for development and maintenance of the platform, is -- is about $200 million a year. I would also add that inclusive in that are licensing fees associated with some of the data that we use for transacting through the platform as well as some of the, you know, costs of contractors or other third-party personnel in order to help support the -- support the -- support the business, so there are some software licensing costs and data licensing costs in that number as well.").

discussed in Section IV.C above, these switching costs are high. Industry participants and observers broadly recognize that publishers face high costs of switching publisher ad servers.[651]

- **Indirect network effects**. To attract publishers with a compelling offering, publisher ad servers need to provide sufficient advertiser demand, through access to ad exchanges and other RTB demand sources. To attract advertiser spending though ad exchanges and RTB sources, a publisher ad server needs to provide access to a meaningful amount of publisher inventory.
- **Google's conduct.** In Section VII, I describe how Google's conduct—in particular Google's exclusive provision of unrestricted access to and use of real-time bids from AdX to DFP—further increases barriers to entry in the publisher ad server market.[652]

V.B.3. Direct evidence of Google's market power in the publisher ad server market

(452) Direct evidence of Google's substantial and sustained market power in the publisher ad server market includes its ability to maintain quality-adjusted prices above competitive levels for DFP, and ability to significantly deviate from competitive behavior by degrading the quality of its DFP product to favor AdX, on which it earns supracompetive profits.

V.B.3.a. Google's DFP is able to maintain quality-adjusted prices above competitive levels

(453) As an initial matter, Google does not appear to earn profit from its market power in the publisher ad server market *solely* through DFP prices and ad serving fees. Instead, there is significant evidence that Google earns profit from publishers' increased usage of DFP through their increased use of AdX and Google Ads, products on which Google earns significant margins.[653, 654]

(454) The economics of this strategy are analogous to the familiar add-on or razor/razor-blade pricing model whereby a firm extracts profits on a complementary good (in this case, AdX) while pricing the

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651 *See* GOOG-DOJ-01657697, at -713 (03/15/2007) ("Due to [DFP's] position as the operating system for ad sales, switching costs are very high"). And at -833 ("We may end up paying a lot for Liberty [code name for the DoubleClick acquisition] because the Y/M inventory combo + advertiser tag switching costs will make it very very hard for us to gain market traction."); *see also* GOOG-TEX-00034461, at -463 (09/10/2012) (September 2012 email from Marc Theermann (Google)) ("Ad Servers are sticky, and hard to replace.").

652 *See, e.g.*, Deposition of John Gentry (OpenX), October 26, 2023, 16:17–17:6, ("Q. So what's your understanding of why OpenX was, to your knowledge, unable to convince publishers to switch from Google's DFP to OpenX's ad server? … A. Because we did not have the access to AdX that we could offer a somewhat competitive similar offering to DFP. … Q. What was the main reason that OpenX existed the publisher ad server business? A. The main reason was because we could not get access. As an asset, we could not get access to AdX demand.").

653 Moreover, DFP also has wielded its market power in the publisher ad server market—and its control over publishers' ad serving decision logic that comes from "owning the tag" on publishers' pages—to further advantage AdX. *See* Section VII.A for a discussion of Google's "own the tag" strategy.

654 Other Google internal correspondence is consistent with Google shifting revenue between products. For example, in 2014, a Google employee described Google Ads as sending Google's publisher platforms a "$3bn yearly check by overcharging our advertisers to ensure we're strong on the pub[lisher] side." *See* GOOG-DOJ-07809181, at -181 (06/24/2014) (Email from Johan Land (Google)).

primary good (in this case, DFP) close to or even below its direct marginal cost.[655] When customers purchase the primary good first and face high switching costs, a firm may optimally chose to exercise its market power over the primary good by earning profit on the complementary good.[656]

(455) Indeed, in this matter, due to the significant value provided to a firm controlling the publisher ad server and securing publisher inventory, DFP can earn significant economic margins and engage in supracompetitive pricing even with a low nominal price: all else equal, in a more competitive publisher ad server market, firms would likely compete away the currently-present economic rents from controlling the publisher ad server.[657] Consistent with this, a 2018 Facebook document described the competition for open-web publisher inventory as a "race to the bottom on margin" and requiring "multi $B" to "lock up inventory."[658]

(456) Google documents support the conclusion that Google collects some of its profit from DFP's market power elsewhere in the ad tech stack.[659] For example,

- In a June 2015 email, Google's group product manager of Ad Exchange, Drew Bradstock wrote, "[w]e do not want to fully embrace header bidding as we are giving away a cheap form of dynamic allocation for free to all our competitors. This would have a large distorting effect on our

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655 *See, e.g.*, B. Douglas Bernheim and Michael D. Whinston, *Microeconomics*, 2nd ed. (New York: McGraw-Hill Education, 2014), 619–621.

656 The economic marginal cost of the primary good is lower than the net cost of production because selling fewer units of the primary good incurs opportunity costs, namely, foregone profits that would have been earned on the sale of the complementary goods. *See, e.g.,* Joseph Farrell and Carl Shapiro, "Improving Critical Loss Analysis," *Antitrust Source* (February 2008), 10 ("Real-world firms often do not maximize the direct, readily quantifiable profits from any one product considered in isolation. When a firm sells competing or complementary products, it will naturally account for spillover effects on profits when setting the price of any one product. Plus, dynamic and intangible considerations, such as customer loyalty, reputation, network effects, and learning curves, commonly arise."). *See also* Joseph Farrell and Paul Klemperer, "Coordination and Lock-in: Competition with Switching Costs and Network Effects," *Handbook of Industrial Organization,* 3, eds. Mark Armstrong and Robert H. Porter (2007), discussing the "bargain-then-ripoff" pricing dynamics that exist in the presence of switching costs and network effects; and Bruno Jullien, Alessandro Pavan, and Marc Rysman, "Two-sided Markets, Pricing, and Network Effects," *Handbook of Industrial Organization,* 4, eds. Kate Ho, Ali Hortaçsu, and Alessandro Lizzeri (2021), discussing the tradeoff of investing to build a customer base with low prices and "harvest[ing]" existing users with higher prices.

657 A firm that owns a publisher ad server does not need to own other ad tech products to profit from control over publisher ad inventory; it can, for example, sell preferential access to its inventory or data to other third-party ad tech providers. *See* Deposition of John Gentry (OpenX), October 26, 2023, 280:18–280:25.

658 *See, e.g.*, FBDOJGOOG_00274748, at -750 (03/19/2018) (Describing an alternative option to an agreement with Google as, "allocate significant investment to lock up inventory through direct deals. Investment here would be substantial and ongoing for as long as we wanted the supply. Like start a race to the bottom on margin. This would **require a significant investment pool** (multi $B) to lock up inventory.") (emphasis in original).

659 Google's DFP revenue share is lower than its other products. Google has expressed its ad serving fees for direct deals as a revenue share of around 1%. Bonita Stewart, "A look at how news publishers make money with Ad Manager," Google Ad Manager blog, June 23, 2020, https://blog.google/products/admanager/news-publishers-make-money-ad-manager/ ("Publisher sales teams do the majority of work with direct advertising deals, keeping over 99% of the revenue they manage. With ads served using Google Ad Manager's technology, Google Ad Manager typically retains under 1%.").

rate card as one of the largest advantages to AdX is real competition. In many regions, especially EMEA, we have given away dfp at huge discounts to get access to inventory via DA."[660]

- In an August 2018 email, Google's global strategy lead Chris LaSala wrote, "[T]here is increased discussion and momentum to change our pricing approach in Google Ad Manager. The very high-level summary is that we historically have been subsidizing the platform (ad server discounts []) with the OA [open auctions] rev share at 20%."[661] He also noted that "[w]e are likely to see pricing pressure on all demand that is not AdWords and I think we can move our fees from OA to core platform [DFP], and let the buy-side manage their take rate independently,"[662] consistent also with Google's ability to raise DFP's prices from existing levels without losing significant sales.

(457) Numerous Google documents also indicate the key role that DFP plays in acquiring publisher display inventory for sale through Google's other ad tech products.[663] Moreover, Google has acknowledged that accessing more publisher inventory through DFP by lowering DFP rates can be profitable as that

[660] GOOG-TEX-00116236, at -236 (07/21/2015). "EMEA" refers to the region of Europe, Middle East, and Africa. "DA" refers to Dynamic Allocation; Sarah Sluis, "Index Exchange Hires Drew Bradstock from Google To Build Forecasting Product," AdExchanger, February 24, 2016, https://www.adexchanger.com/platforms/index-exchange-hires-drew-bradstock-from-google-to-build-forecasting-product/.

[661] GOOG-DOJ-07799709, at -709 (08/07/2018); Deposition of Chris LaSala (Google), Oct. 10, 2020, 29:6–29:9 ("Q. And so how have you been – did you say that you've been global strategy lead for five years? Yeah...").

[662] GOOG-DOJ-07799709, at -709 (08/07/2018).

[663] "Owning the ad serving tag is the right strategy and AdX (and DBM & AdWords) benefits from the direct line of inventory provided by DFP via dynamic allocation." *See* GOOG-DOJ-04830048, at -048 (09/05/2017). *See also* GOOG-DOJ-04445011, at -014 (05/2013) ("DFP – without DFP, would lose privileged access to inventory … the function in DFP that enables GDN and Exchange buyers access to inventory that they cannot sell directly, or that we can sell at a higher pricepoint, is a huge business - $2.1B business."). *See also* GOOG-TEX-00124296, at -390 (08/29/2016) ("Failure to succeed in programmatic direct could pose a serious threat to our DRX open auction business: we gain access to most of the inventory for OA by being the primary publisher ad platform (tag on the page") *See also* GOOG-DOJ-13218256, at -256 (10/11/2018) ("Historically, Sales (and DVAA more broadly) has optimized primarily for gross revenue and inventory access. As a result, Sales has pushed publishers to the much cheaper AM product and has been willing to make exceptions for most of the (small number of) features that differentiate AM and AM 360.") *See also* GOOG-DOJ-13218256, at -256 (10/11/2018) ("Some of our largest publishers use our AM product. We aren't adequately extracting value from publishers with a high willingness to pay. There is good reason to believe that we could make significantly more than our current platform fees of $250M ARR.").

inventory can be monetized by Google's other products.[664, 665] Another value that Google derives from DFP volume is user data, which it shares with its other products.[666]

(458) Google internal analyses also are consistent with publishers' limited ability to substitute away from DFP in the event of a price increase. For instance, a 2019 Google document described a DFP price increase of 10% as one "we believe the market will bear."[667] Another Google document from 2018 stated that raising "DFP serving fee ~20%" without changing AdX's price would increase its net revenue by $40–$50 million.[668]

(459) Moreover, as far back as 2010, Google noted that DFP's rate card was "~50-100% higher than competitors in US," and ">50% higher than competitive rates," indicating "customers are willing to pay a premium for DFP."[669]

(460) In addition to its base rates, Google charges a 5%-10% fee to publishers for use of Open Bidding within GAM.[670] This charge is substantially higher what other header bidding tools charge: for example, Amazon's header bidding solution, Transparent Ad Marketplace (TAM), charges a fee of

[664] *See, e.g.*, GOOG-AT-MDL-001274268, at -273 (01/18/2013) ("What we know: if waiving DFP fees move > 5% of imps not allowed for Google monetization to allowed, then this is value creating for Google overall"); *see also* GOOG-AT-MDL-001274268, at -280 (01/18/2013) ("Waiving DFP when Google monetizes seems attractive since there is ample inventory to grow monetization"); *see also* GOOG-DOJ-02148008, at -009 (03/23/2009) (Susan Wojcicki, Google VP, Ads Product Management, wrote, "DFP is key to get more GCN quality impressions… we should do the analysis this way so we understand the value DFP brings to GCN."). GCN stands for Google Content Network, which changed to Google Display Network in June 2010 (Google, "Introducing the Google Display Network," *Inside AdWords*, June 18, 2020, https://adwords.googleblog.com/2010/06/introducing-google-display-network.html).

[665] The economic literature has discussed a variety of reasons why a firm with substantial market power may choose to price below the short-run or static profit-maximizing level for a given product. These include earning profits on the sale of complementary products, reasons related to switching costs and network effects (e.g., so-called "invest-and-harvest" dynamics), and to deter entry and to deny rivals scale. *See, e.g.,* n. 656 discussing pricing of complementary products and pricing in the presence of switching costs and network effects; Dennis W. Carlton and Michael Waldman, "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries," *RAND Journal of Economics* 33, no. 2 (2002), 194–220 (discussing how a monopolist of a primary good may find it profitable to engage in a "virtual tie" by charging a very low price on a complementary product to deter entry when there are network externalities).

[666] *See* Section V.B.1.

[667] I discuss net revenue in Section II.D. GOOG-DOJ-09712720, at -809 (08/07/2019) (2019 Strategy Book for DVAA reads "Update the Ad Manager rate card" as a strategy for 2019. Google describes their rate increase strategy as follows: "Platform revenues have not been a priority for ten years, but we believe the market will bear a price increase that reflects fair value and remains competitive. We plan to 1) increase fees for non-video tag-based queries by 10% or more, within the bounds of market acceptance and pending legal review; and 2) introduce new fees where we deliver additional value, such as complex header-bidding setups and tag-based reservations.").

[668] GOOG-TEX-00124787, at -798 (07/09/2018) ("Raise DFP serving fee ~20%; no AdX price change; Fees for complex HB setups. Google net revenue increase ($40-50M).").

[669] GOOG-AT-MDL-B-000030077, at -846, -086, -089 (05/13/2010).

[670] GOOG-AT-MDL-006218271, at -289 (01/06/2023) (Google's Jan 6, 2023 responses to European Commission's RFI 10, "For publishers that utilize Google's Open Bidding (formerly known as Exchange Bidding) tool, when an auction is won by an Open Bidder, Google's standard charges are (and have been historically) a revenue share rate of 5-10% (instead of the ad exchange revenue share)").

2.5% for display inventory; other open-source header bidding solutions, such as Prebid, are free (but require engineering investment to configure and optimize).[671]

V.B.3.b. Google is able to significantly deviate from competitive behavior in the publisher ad server market

(461) Evidence that Google has substantial and sustained market power in the publisher ad server market includes its ability to meaningfully deviate from competitive behavior in that market without losing significant sales. In a competitive market, a firm loses significant sales if it degrades the quality of its product, all else equal.

(462) Google has been able to degrade the quality of DFP in ways that advantaged AdX, to the detriment of publishers, while maintaining a dominant share of the DFP market.[672] As OpenX CEO John Gentry noted in deposition, "they have such a dominant position that no publisher, at this point, has any realistic opportunity or would think necessarily about switching off of Google's ad server. So with that being the case, they could make, really, whatever changes they want to make despite the fact that, you know, a publisher might not like it."[673]

(463) First, Google used DFP's substantial market power to grant AdX exclusive first- and last-look advantages by originally excluding rival exchanges from Dynamic and Enhanced Dynamic Allocation until the introduction of Exchange Bidding (fully launched in 2018). Second, Google also removed variable pricing floors across exchanges within DFP, thereby impeding publishers' abilities to work with rival exchanges. I discuss both of these actions further in Section VII.D. If DFP did not possess substantial market power and the publisher ad server market were competitive, Google likely would not have found it profitable to engage in such actions, as doing so would likely have lost Google and DFP a significant number of publisher customers.

(464) Indeed, Google's refusal to allow DFP customers to work on equal terms with rival exchanges as with AdX significantly contributed to the rise of header bidding, which became widely used in the 2014-2015 period.[674] It is notable that during this period, when DFP did not offer publishers the ability to place AdX in competition with real-time bids from rival ad exchanges, publishers resorted to using header bidding (with its associated limitations and complications) rather than switch to another alternative publisher ad server.[675] As noted in a 2016 Google strategy paper, "[t]he header ecosystem

[671] *See* Section II.

[672] Between January 2018 and September 2019, DFP's maintained a 90% or greater share of impressions among publisher ad servers who produced data in each month. Following the release of UPR in September 2019, which many publishers viewed unfavorably (see Section VII.D.2), Google maintained its 90% or greater share. *See* Figure 45.

[673] Deposition of John Gentry (OpenX), October 26, 2023, 31:18–32:7.

[674] *See* discussion in Section II.E.3 and Appendix L.2.

[675] *See* Sections II.E.3 and Appendix L.2 and L.3 for additional discussion of header bidding.

relies on our unwillingness to open our systems to the types of transactions, policies and innovations that buyers and sellers wish to transact."[676]

(465) Moreover, as I described above, when Google made Open Bidding broadly available in 2018, it charged 5-10% for use of this functionality, more than the cost of alternative header bidding tools (as discussed above). In a more competitive market, a rival publisher ad server alternative that enabled publishers to access multiple ad exchanges in real-time would likely have restricted Google's ability to profitably levy such a fee.

V.C. Google possesses substantial and sustained market power in the ad exchange market

(466) Google's ad exchange, AdX, is the largest ad exchange for open-web display transactions, and possesses substantial market power. In this section,

- I first describe how AdX's market power derives in large part from its advantaged treatment by Google Ads and DFP (Section V.C.1).
- I then provide measures of AdX's market shares and discuss barriers to entry and expansion in the ad exchange market (Section V.C.2). AdX is by far the largest exchange in the ad exchange market across a variety of measures. Among worldwide indirect open-web display transactions, I calculate that AdX has maintained a share of over 50-60% of impressions and over 40% of fees since 2018. Barriers to entry and expansion include significant fixed costs of building, maintaining, and starting an ad exchange; and overcoming network effect and data disadvantages relative to incumbents.
- Last, I provide direct evidence of AdX's market power (Section V.C.3). AdX has maintained a supracompetitive take rate of 20% since 2012 while maintaining high market shares. Google's own analyses also indicate that Google could profitably raise AdX's take rate above competitive levels. Moreover, Google's conduct, including its ability to dynamically adjust reserve prices (starting in 2015) and use AdX to favor its own products in the ad tech stack even while degrading the quality of AdX by not submitting real-time bids into rival publisher ad servers, also demonstrate AdX's substantial market power. Such conduct would not be sustainable in a competitive market, as customers would substitute away to comparable alternatives to an extent to make this conduct unprofitable.

(467) Substantial barriers to entry and expansion in the ad exchange market have protected Google's dominant position, and allowed it to maintain a high take rate and take actions that degrade AdX's

[676] GOOG-TEX-00097138, at -138 (09/26/2016) ("Integrating All Demand DRX Strat Paper").

(475) Even though some of AdX's advantages within DFP have been reduced over time (for example, with the introduction of Open Bidding), due to the durability of network effects, the impact of Google's actions on AdX's market power likely persists.[686]

V.C.2. Indirect evidence of Google's market power in the ad exchange market

(476) Google's high market shares across a variety of measures, as well as evidence of significant barriers to entry, provide indirect evidence of Google's substantial and sustained market power in the ad exchange market.

V.C.2.a. Market shares

(477) Below, I provide evidence that Google's exchange product, AdX, has a high share in the ad exchange market across a variety of measures and is the largest player in this market, and has been for a number of years. This is consistent with third-party testimony describing AdX as "dominant" among ad exchanges.[687]

(478) Google documents indicate that AdX transacts a large share of open-web display transactions. For example, according to a December 2019 Google presentation (see Figure 46 below), between October 2018 and November 2019, AdX and AdSense accounted for over 50% of total spend on remnant served impressions for a set of Google's largest publisher customers, with the combined share increasing from 51% in the start of the period to 58% by November 2019.[688] A large amount of

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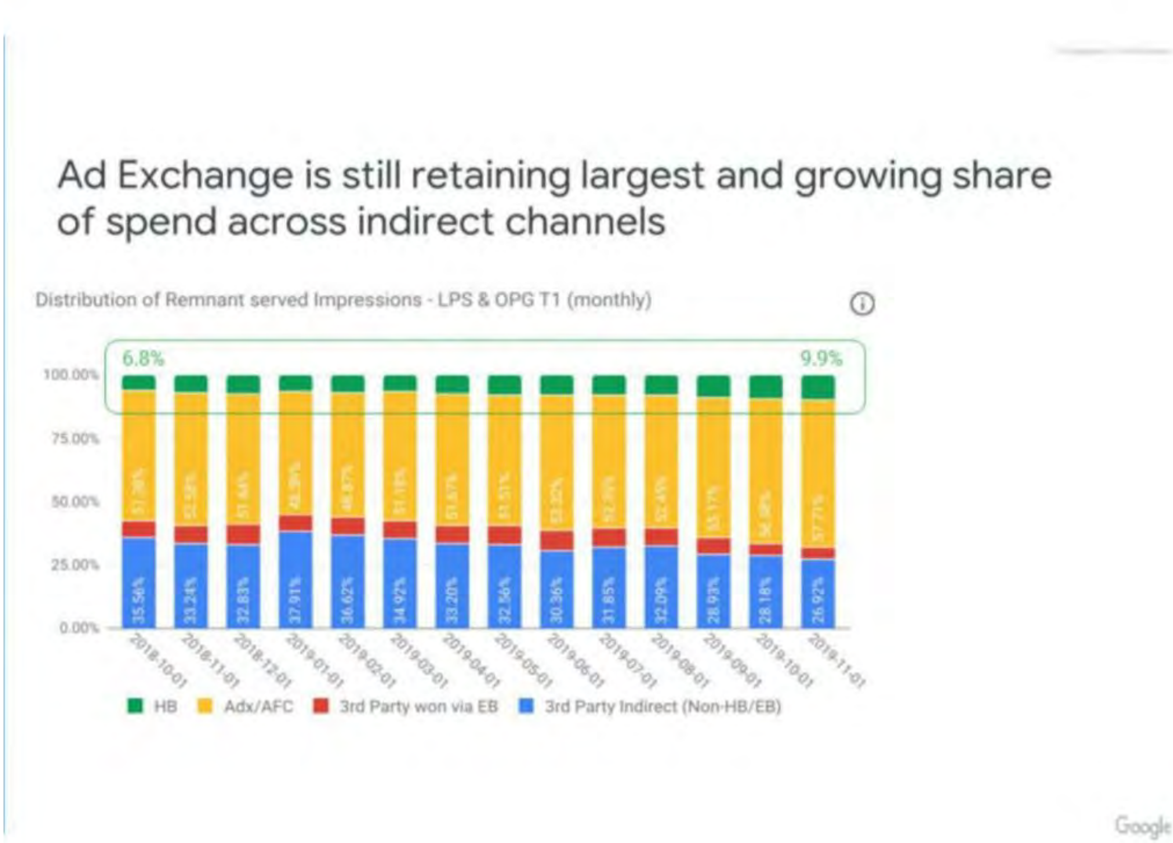
686 *See* Section III.D.1 regarding the persistence of network effects, and Sections VII.D and VII.F.1 regarding AdX's advantages within DFP.

687 *See, e.g.,* Deposition of Adam Soroca (Magnite), August 31, 2023, 20:7–16 ("Q. [H]ow would you characterize Google AdX's position in the display ad exchange business? … A. The dominant player in the market. Q. And why do you view Google's AdX as the dominant display ad exchange? … A. As we talk with our publishers and our advertisers they signal that that is the case.").
Deposition testimony indicates that rival exchanges have significantly lower share. *See, e.g.,* Deposition of Andrew Casale (Index Exchange), September 26, 2023, 145:6–14 and 146:4–11 ("Q. And what is Index's approximate market share in programmatic open web display? A. There is no formality around that, so I would be guessing. But low single digits. But again, we have no way to know….Q. And do you have any notion of what Index's market share is in open web display in the United States as opposed to globally? A. It would likely be a few points higher. But again, low single digits.");
Deposition of Andrew Casale (Index Exchange), September 26, 2023, 147:5–147:15 ("Q. And how does the market share of folks like Magnite, PubMatic, and Index compare to the market share of a company like AdX? A. I think combined we're still quite a bit smaller. Q. Even combining all three together against AdX by itself? A. Yes.");
Deposition of Adam Soroca (Magnite), August 31, 2023, 21:15–22:11 ("Q. For display advertising, among the various different exchanges, which exchange does Magnite compete with most closely? A. We view our direct competitors as companies including PubMatic; Index Exchange; OpenX; now inside of Microsoft, Xandr. Q: And why didn't you say AdX in that list of companies? A. Because they're in a different category in terms of their size and our ability to compete and take share. Q. And why do you say they're in their own category? A. They have such a significant share differential between us and our peers that there seems to be a ceiling on which we can gain ground. And so we typically just try to take share primarily from the list that I gave you.").

688 GOOG-DOJ-11794721, at -739 (12/2019) (Showing "Distribution of Remnant served Impressions – LPS & OPG T1," noting "Ad Exchange is still retaining largest and growing share of spend across indirect channels").
Another document indicates that transactions served by AdSense through backfill make up a small percentage of total DFP impressions. GOOG-TEX-00099020, at -022 (04/04/2017) (Google sell-side platform metrics from 2017 show that

display web inventory is also accessible through AdX: an internal Google presentation from 2018 notes that roughly 65% of "addressable impressions" worldwide are accessible through a combination of both AdX and Google's AdSense products.[689]

Figure 46. AdX/AdSense share of indirect remnant served impressions



Source: GOOG-DOJ-11794721, at -739 (12/2019).
Notes: *According* to Google's Dec 12, 2022 response to European Commission's RFI 10 GOOG-AT-MDL-006217592, at -601, "LPS and OPG are both parts of Google's sales organisation, Global Business Operations: (a) "LPS" stands for Large Partner Sales. LPS covers Google's 100-200 largest sell-side partners. (b) "OPG" stands for Online Partnerships Group. OPG covers the remaining sell-side partners."

(479) AdX also likely had a significant market share in earlier periods. For example, a 2013 Google presentation referenced above reported AdX's share of indirect impressions to be 27% with an 87% year-over-year growth (see Figure 44 in Section V.B.2.a), and described it as a "cash cow" of its display business.[690]

while nearly half of DFP queries were backfill-enabled, just 5% of those impressions were filled by AdSense, while 30% were filled by AdX.).

689 Worldwide excludes China and six specific Japanese domains. *See* GOOG-DOJ-04442323, at -351 (09/11/2018).

690 GOOG-DOJ-04445011, at -014 and -015 (05/2013).

(480) Google's high share in the ad exchange market is also corroborated by data produced in this case. As I show below, market share measures are consistent with AdX possessing substantial and sustained market power in the exchange market.

(481) I present market shares based on impressions, or transactions served, by an ad exchange. As I discussed in Section III.D, via economies of scale and data, scale as measured by the volume of transactions handled by an ad tech product is important for an exchange's competitiveness.[691] For this reason, impression shares directly inform relative scale advantages enjoyed by different products, and high impression shares are consistent with the possession of substantial market power. I also present net revenue, or "fee," shares.[692] Although net revenue shares may reflect additional differences in ad tech products' ability to earn fees and returns on investment, they are less directly informative for competitive differences arising from scale effects.

(482) **Impressions**. When examining relative impression shares among ad exchanges that produced data in this matter, I find that AdX's share of worldwide open-web display impressions ranges from roughly 63% to 71% between 2018 (the first year when the majority of exchanges that I have data from began reporting data) and 2022.[693]

(483) However, because I do not have access to data from all participants in the ad exchange market, the above share calculation does not contain transactions from those other ad exchanges and hence overstates AdX's share among all ad exchanges. To obtain a rough estimate of the number of transactions served through ad exchanges for which I do not have data, I perform the following calculation.[694] First, I obtain the total number of worldwide indirect open-web display impressions that are purchased through ad exchanges from all bidding tools (DSPs and advertisers ad networks) that produced data sufficient to identify transactions by exchange. I compute that, in the years 2018 – 2022, the exchanges for which I have data represent approximately 58%–84% of worldwide open-web display transactions for this set of bidding tools, excluding DV360 and Google Ads (which meaningfully restrict bidding on non-Google ad exchanges). This figure is greater than 70% starting in 2019. Hence, although the ad exchanges that produced data comprise a substantial share of indirect

691 *See, e.g.,* Deposition of Andrew Casale (Index Exchange), September 26, 2023, 238:7–238:22 ("Q. What do you consider to be the most relevant metric or metrics for measuring scale in programmatic open web display?... A. I would say the total volume of auctions that you run, that's your ability to absorb the entirety of the scale of publishers, and then the total volume of auctions you clear which is really the most powerful signal that you give to any model, whether it be for price discovery, the win rate curves that I had mentioned or any form of curation."); Deposition of Jessica Mok (Google), November 10, 2023, 53:2–16 ("Q. And what about the products within DVAA? A. The allocation of costs -- machine costs to product P&Ls within DVAA, we -- the methodology has evolved over time. Currently, we use -- currently, I think we use impressions. Q. And at the product level, so say for AdSense, are machine costs allocated according to the number of impressions? A. I believe so. Q. And what about for AdX? A. Same. […] Q. What about Google Ads? A. Share of impressions, yes.").

692 In Appendix D.1.c I also calculate spending (gross revenue) shares and show that they are similar to net revenue shares.

693 *See* Figure 88 in Appendix D.1.

694 I describe this calculation in more detail in Appendix H.

open-web display transactions, there is still likely a meaningful share represented by other ad exchanges.

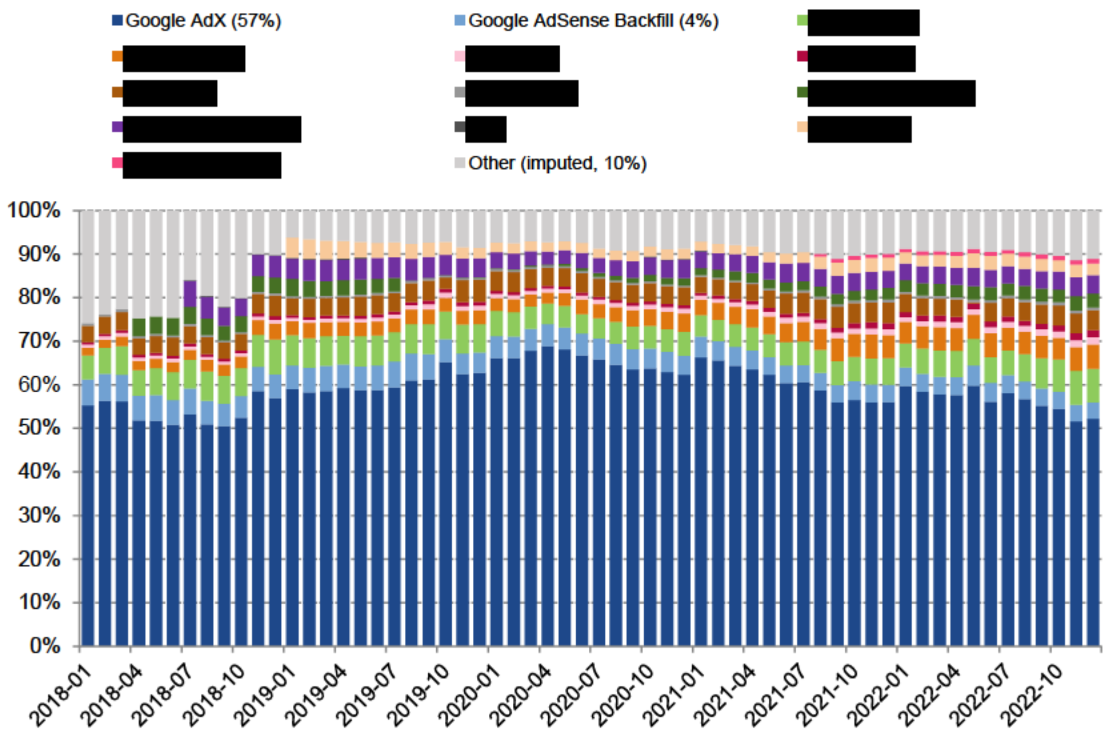
(484) Following the approach outlined above, I am able estimate the total number of indirect open-web display impressions in each month transacted through ad exchanges that did not produce data using data produced by DSPs and advertiser ad networks.[695] I use these estimates to supplement data produced by ad exchanges and am thus able to estimate the total number of indirect open-web display impressions transacted by ad exchanges in each month.

(485) Using this approach to estimate total indirect open-web display impressions transacted by ad exchanges, I plot in Figure 47 Google AdX's share of worldwide indirect open-web display impressions among ad exchanges between 2018 and 2022. During this period, impressions transacted via Google's AdX represented approximately 54% to 65% of annual worldwide open-web display impressions sold through ad exchanges. As Figure 47 below shows, in 2022, AdX had roughly 9 times the number of worldwide open-web display RTB impressions of the next largest ad exchange that produced data.[696]

[695] To estimate the total number of open-web display impresions transacted through ad exchanges that did not produce data on this matter, I use data produced by DSPs and advertiser ad networks that contains information on transactions by exchange. Among these bidding tools (excluding Google Ads and DV360), I calculate the ratio of impressions from exchanges that did not produce data relative to impressions from exchanges that produced data in each month. I apply that ratio to the number of impressions from ad exchanges that did produce data in each month (with adjustments to account for transactions through these ad exchanges from Google's bidding tools) to estimate the number of impressions from "other" exchanges. Appendix H describes how I perform this calculation in more detail.

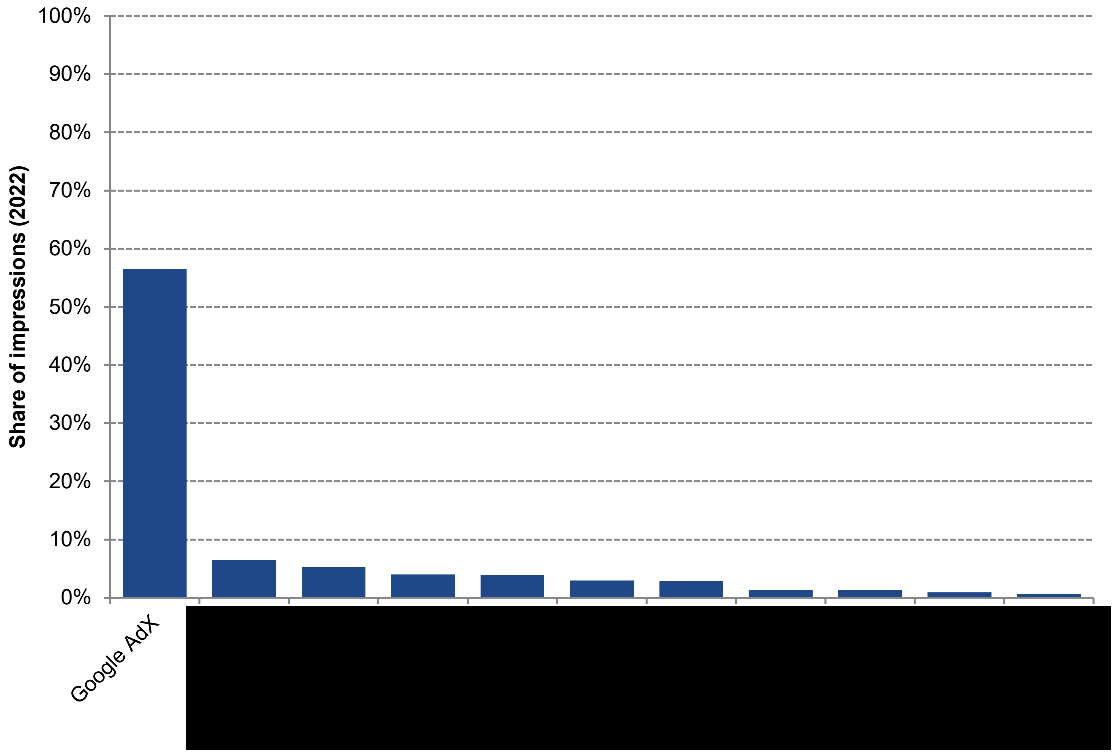
[696] The next-largest ad exchange that produced data was Magnite. In 2022, AdX transacted roughly 6T indirect open-web display impressions worldwide (DOJ RFP 53); Magnite transacted 688B indirect open-web display impressions (Magnite exchange data).

Figure 47. AdX maintains a substantial share of worldwide indirect open-web display impressions transacted through ad exchanges (2018–2022)



Source: Google AdX data (DOJ RFP 53); Exchange panel (*See* Appendix H.1.c).
Notes: Denominator includes impressions from Google and ad exchanges that produced data in this matter, and impressions estimated from exchanges that did not produce data on this matter ("Other (imputed)"). The set of exchanges within "Other (imputed)" varies during the time period shown due to incomplete data from certain third-party exchanges. Appendix H provides a description of how I perform this estimation. The legend contains the share of indirect open-web display impressions in 2022 in parenthesis for those exchanges that produced data on indirect open-web display impressions in 2022.

Figure 48. AdX and third-party ad exchanges' shares of worldwide indirect open-web display impressions among ad exchange (2022)



Source: Google AdX data (DOJ RFP 53); Exchange panel (*See* Appendix H.1.c).
Notes: 2022 worldwide indirect open-web display impression market shares for ad exchanges shown in Figure 47 (see table notes). In 2022, exchanges that did not produce data are estimated to represent 10% of worldwide indirect open-web display impressions. The largest of those exchanges, [redacted] represented less than 5% of impressions through bidding tools that produced by-exchange data.

(486) Due to data limitations, I am unable to compute reliable ad exchange market shares based on transactions restricted to ad exchange customer locations—i.e., based on transactions involving US open-web publishers or US advertisers.[697] However, I am able to present market shares based on *user locations*—i.e., based on the location of the visitor to a publisher's website. Such share calculations based on user locations can still be informative for at least two reasons.

(487) First, publishers and advertisers in the US may particularly value ad tech products used to buy and sell display advertisements served to *users located in the US*. Consistent with this, a large fraction of open-web display transactions served by US publishers and purchased by US advertisers involve US users. For US publishers engaged in indirect open-web advertising on AdX and AdSense, a large proportion of their display advertising transactions involve US users (57% of impressions and 81% of spending for US AdX publishers, and 57% of impressions and 81% of spending for US AdSense

[697] Information on publisher and advertiser geographic locations are missing from data provided by many third-party ad exchanges, advertiser ad networks, and DSPs that produced data in this matter.

Backfill publishers).[698] For US advertisers engaged in indirect open-web advertising on DV360, a large proportion of their display advertising transactions involve impressions from US users (72% of impressions and 90% of spending).[699]

(488) Since advertisers and open-web publishers located in the US are thus likely to particularly value ad tech products that are able to effectively serve display ads to US users, an ad tech product's high market share over US users can inform the extent to which that product is attractive to US customers (i.e., US open-web publishers and US advertisers).

(489) Second, I am able to compare market shares based on user locations to those based on customer locations for a subset of exchanges whose data provide information on both publisher and user locations for indirect open-web transactions between 2020 – 2022. These exchanges include AdX, Magnite, Index Exchange, OpenX, and Equativ. I find that impression and net revenue shares among this subset of exchanges are very similar across transactions involving US publishers *or* US users.[700] Hence, even though market shares computed using transactions involving US users are not the same as those computed using transactions involving US publishers, this analysis suggests that they may be close.

(490) Having acknowledged these considerations, I calculate AdX's market share over transactions involving US users across a broader set of ad exchanges, and note that it is also high.[701] Limiting to indirect open-web display impressions for US users, AdX's share is between 45–55% from 2018 through 2022.[702] For 2022, this is 5 times as large as the next largest ad exchange competitor that produced data.[703]

(491) Summarizing the above results, I calculate that AdX has maintained approximately an annual 55–65% share of worldwide indirect open-web display impressions among ad exchanges since 2018.

[698] Google AdX data (DOJ RFP 53); Google AdSense Backfill data (DOJ RFP 7).

[699] Google DV360 data (DOJ RFP 7).

[700] For example, I find that there is less than a 1.5% share difference for AdX among this subset of exchanges, for both impressions and net revenues and across all years 2020 – 2022, between US market shares computed based on user versus publisher location. *See* Figure 86 and Figure 87 in Appendix C.4. (Equativ data does not contain net revenue information and is excluded from the calculation of net revenue shares).

[701] To estimate the size of US-user impressions transacted by ad exchanges that did not produce data, I perform the following exercise: I first compute the the average ratio of impressions for US users relative to impressions for all users among ad exchanges who produced data with sufficient user-geography information. I then apply that average ratio to the estimate of total worldwide impressions for the exchanges who did not produce data at all or who did not produce data with US-user breakdowns. *See* Appendix H.

[702] Figures depicting shares based on impressions from US users are contained in Appendix D.1.b.

[703] In 2022, AdX transacted roughly 1.4T indirect open-web display impressions served to US users (Google AdX data (DOJ RFP 53)). PubMatic transacted just 275 billion indirect open-web display impressions served to US users during this period (PubMatic exchange data).

Limited to impressions from US users, AdX has maintained approximately an annual 45–55% share since 2018.[704]

(492) Note that Verizon (Yahoo) shut down its exchange product to open-web publisher inventory in 2023.[705] Excluding Verizon's impressions from the ad exchange market size would provide AdX a 58% share of worldwide impressions and a 48% share of impressions from US users in 2022.[706]

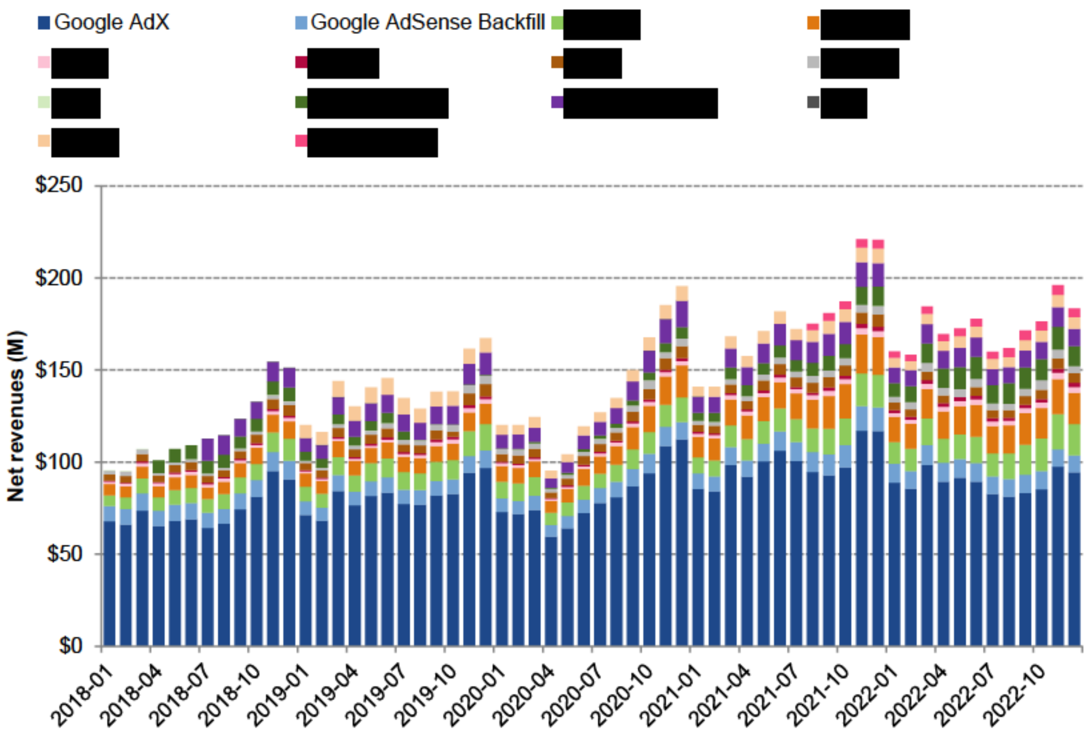
(493) **Net Revenues (Fees).** Figure 49 below shows net revenues on worldwide indirect open-web transactions collected by ad exchanges for which I have data. AdX collects significantly more fees for transacting indirect open-web display impressions than other exchanges depicted. Since 2018, the first year that data is available for most exchanges, AdX has accounted for over 55% of total fees collected by this set of exchanges.

[704] For robustness, I have analyzed AdX's market shares across several alternative specifications and find that these results are consistent. *See* Figure 89 in Appendix D.1.

[705] Sara Fischer, "Exclusive: Yahoo to lay off more than 20% of staff as it shrinks ad biz," Axios, February 9, 2023, https://www.axios.com/2023/02/09/yahoo-layoffs-2023-tech-media-companies. *See also* YAH_GG_LIT_004590 (06/26/2023).

[706] *See* Figure 88 and Figure 89 in Appendix D.1.a.

Figure 49. AdX earns consistently high net revenues from the sale of worldwide indirect open-web display impressions (2018–2022)

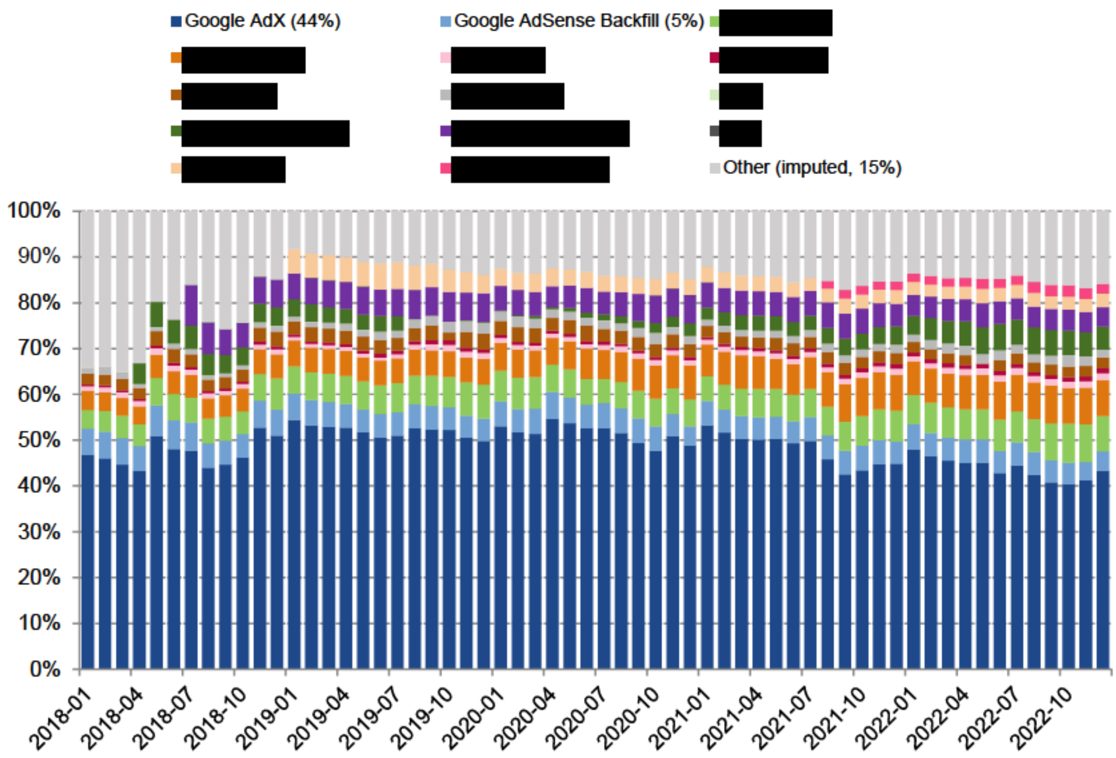


Source: Google AdX data (DOJ RFP 53); Exchange panel (*See* Appendix H.1.c).
Notes: 1. Includes net revenues from Google and exchanges that produced data in this matter. 2. AdSense Backfill refers to the set of transactions that are served from AdSense through DFP. Google charges a single 32% take rate for transactions through AdSense (including those through AdSense Backfill) and does not separate the take rate into buy-side and sell-side components. For the purposes of these share calculations, I apply the full 32% take rate to transactions through AdSense Backfill. 3. For exchanges from which I have data on gross revenue but not net revenue, I apply the weighted average take rate among third-party exchanges that produced both gross and net revenue data to those exchanges' spend.

(494) However, for the same reasons as I discussed above, these overstate AdX's shares among all ad exchanges as they do not include ad exchanges for which I do not have data. Hence, I obtain an estimate of AdX's share of fees among all ad exchanges as follows. First, using a similar approach that I described above for computing impression shares in the ad exchange market, I estimate the share of total ad exchange *spending* from ad exchanges for which I do not have data. Second, I apply the average take rate charged by the third-party exchanges that I do have data from in order to obtain an estimate of the share of *fees* from these ad exchanges that did not produce data. As Figure 50 below shows, under this calculation method, AdX's share of ad exchange fees is approximately 40–45% in 2022.[707] As shown in Figure 51 below, in 2022, AdX's net revenue shares were over 5 times higher than net revenues for the next largest ad exchange for which I have data ([redacted].

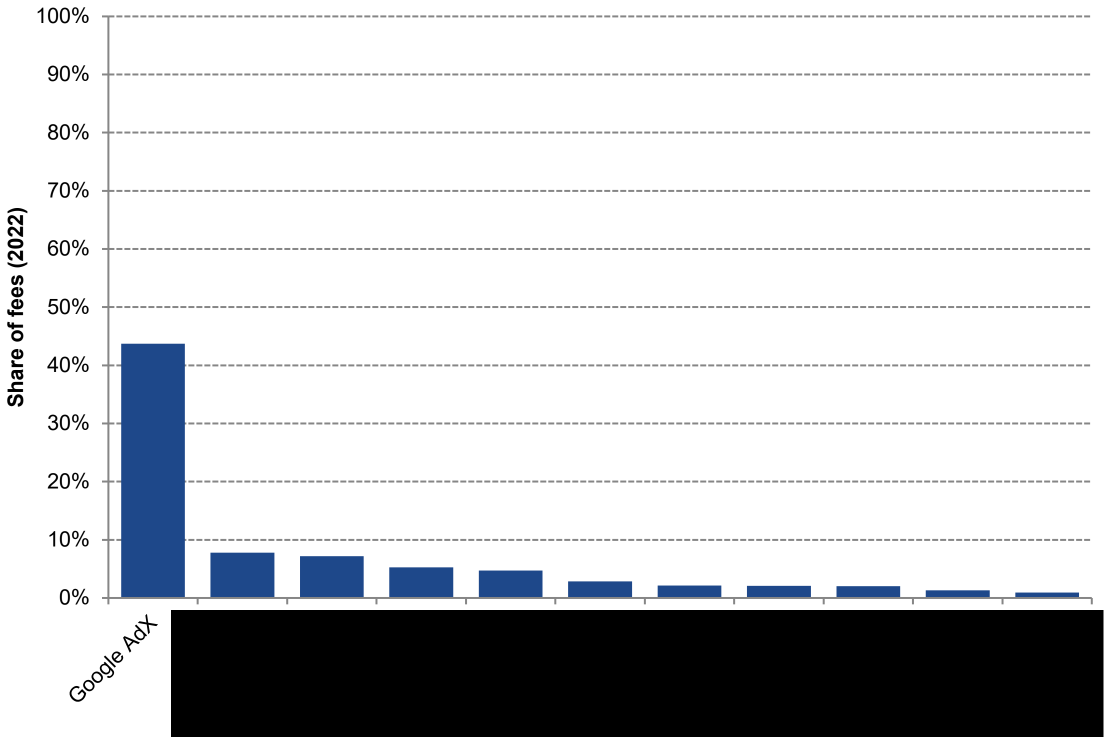
[707] Limited to fees collected from impressions served to US users, AdX's share of ad exchange fees is 36% in 2022. *See* Figure 92 in Appendix D.1.a.

Figure 50. AdX maintains a significant share of ad exchange fees from worldwide indirect open-web display transactions (2018–2022)



Source: Google AdX data (DOJ RFP 53); Exchange panel (*See* Appendix H.1.c).
Notes: 1. Includes net revenues from Google and exchanges that produced data in this matter as well as net revenues that I estimate coming from exchanges that did not produce data on this matter. Appendix H contains a description of how I perform this estimation. For exchanges that produced fees data in 2022, the legend lists the exchange's share of fees in 2022 in parentheses. 2. AdSense Backfill refers to the set of transactions that are served from AdSense through DFP. Google charges a single 32% take rate for transactions through AdSense (including those through AdSense Backfill) and does not separate the take rate into buy-side and sell-side components. For the purposes of these share calculations, I apply the full 32% take rate to transactions through AdSense Backfill. 3. For imputed "other" exchanges as well as exchanges from which I have data on gross revenue but not net revenue apply the weighted average take rate among third-party exchanges that produced both gross and net revenue data to those exchanges' spend.

Figure 51. AdX and third-party ad exchanges' shares of ad exchange fees from worldwide indirect open-web display transactions (2022)



Source: Google AdX data (DOJ RFP 53); Exchange panel (*See* Appendix H.1.c).Notes: 2022 worldwide indirect open-web display net revenue market shares for ad exchanges shown in Figure 50 (see table notes). In 2022, exchanges that did not produce data are estimated to represent 17% of worldwide indirect open-web display spend. The largest of those exchanges, Triplelift, represented less than 7% of spend through bidding tools that produced by-exchange data.

(495) Hence, worldwide, AdX has maintained an annual fee share greater than 40% since 2018. Limited to transactions originating from users located in the United States, AdX has maintained an annual fee share greater than 35% since 2018.[708]

V.C.2.b. Barriers to entry and expansion

(496) There are substantial barriers to entry and expansion in the ad exchange market. These include:

- **Costs of building/maintaining/starting an ad exchange.** Ad exchanges are complex products to engineer that require both fixed and recurring investments in infrastructure to offer exchange

[708] *See* Figure 89 in Appendix D.1.a.

services.[709] Rival exchanges have also emphasized the costs of establishing integrations with publishers and DSPs as a significant barrier to entry in the exchange market.[710]

- **Network effects.** Ad exchanges generate value by connecting publisher supply with advertiser demand. Ad exchanges are more highly valued by publishers to the extent they can connect publishers to more advertiser demand and are more highly valued by advertisers to the extent they can connect advertisers to more publisher supply. A new entrant into the ad exchange market lacking access to substantial publisher supply or advertiser demand thus faces a chicken-and-egg problem in building an attractive exchange: publishers will not be willing to incur the costs of establishing a relationship with an exchange without access to substantial demand, and advertisers or their representatives will not be willing to incur the costs developing such a relationship without access to substantial supply.

- **Access to data**. Access to user data gives existing ad exchanges a substantial advantage over new exchanges without access to such data. As I described in Section III.D.3, an ad exchange can provide additional targeting information for a given impression to potential bidders, which can increase an advertiser's value for given impressions, and by extension its willingness to pay, thereby improving publishers' expected monetization from an exchange.[711] Exchanges such as AdX also rely on large-scale data to determine how to dynamically adjust their take rates and improve profitability.[712] Rival exchanges have recognized the lack of data as a barrier to competing successfully in the exchange market.[713]

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709 *See* Section III.D.2. *See also* PUBMATIC_DOJ-00000041, at -057–058 (09/03/2019) (PubMatic submission to CMA, "[t]here is significant cost and scale required to maintain an SSP…the infrastructure costs are high to support the scale that PubMatic does…the costs do not scale well. Each ad impression and Ad Exchange has a certain amount of fixed cost tied to server processing, connectivity, storage, and bandwidth.").

710 *See, e.g.,* Deposition of Andrew Casale (Index Exchange), September 26, 2023, 135:8–137:13 ("Q. Have you ever heard of the concept of barriers to entry to a market? A. Yes. Q. How would you characterize the barriers to entry to the exchange market for open web display transactions?... THE WITNESS: I think they're rising all the time and have never been higher for a variety of reasons, and the cost to build the platform is not trivial, the time to build it is not trivial. A platform is meaningless without integrations. To establish integrations with major publishers and major DSPs takes a significant amount of time. There's a significant cost burden to process the scale of transactions in this marketplace. And more recently there is a growing regulatory burden to be in compliance with regulations from a privacy perspective. So yeah, I'd say the barriers continue to rise and have never been higher. Q. How many DSP integrations does Index have today? A. I don't know the specific stats particular, but I would estimate in approximately seventy-five. Q. And how long did it take Index to onboard that many DSP integrations? A. DSP one was onboarded in 2011 and we're still integrating DSPs today. Q. And is that a time-intensive process to onboard DSPs?... THE WITNESS: It's the longest sales cycle we have in Index. Some integrations we have literally waited five years to win. And then there is an integration process and a ramp up process before we have a competitive allocation of their demand. Q. And from first outreach to competitive allocation of demand, what is the average amount of time it could take? A. Six to twelve months. Q. And potentially longer? A. As I mentioned, we have DSPs that it's taken five years to integrate.").

711 *See* Section III.D.3.

712 *See* Section III.D.3 for further details; Section VII.D.1.b also contains a more detailed discussion of AdX Dynamic Revenue Sharing ("DRS"), which dynamically adjusted take rates.

713 Deposition of Andrew Casale (Index Exchange), September 26, 2023, 234:13–236:7 ("Q. How would you characterize the level of difficulty for a new business to enter the exchange market today?... THE WITNESS: I would say when we pivoted the company in 2010, it was near impossible, and it's thirteen years later. So near impossibly impossible. Q. And can you give me some of the reasons why it's near impossibly impossible?... Or would be. A. It's very expensive

- **Google's conduct.** Google's conduct has increased barriers to entry and expansion in the ad exchange market by foreclosing rival ad exchanges from Google Ads demand (see Section VII.B) and previously restricting access to dynamic allocation within DFP (see Section VII.D.1).

V.C.3. Direct evidence of Google's market power in the ad exchange market

(497) Direct evidence of Google's substantial and sustained market power in the ad exchange market includes its ability to charge supracompetitive prices (while maintaining a high market share), degrade AdX's quality by limiting unrestricted access and use of its real-time bids to DFP, and vary its revenue share and reserve prices significantly across impressions.

V.C.3.a. Google AdX is able to maintain quality-adjusted prices above competitive levels

(498) Three types of evidence indicate AdX profitably levies supracompetitive fees, and hence that AdX possesses substantial market power. First, Google documents and internal analyses point to its ability to control prices and profitably charge fees above competitive levels without losing a significant amount of its transaction volume. Second, Google and third-party documents indicate that AdX maintains a higher take rate than other exchanges, and has maintained a substantial take rate for years despite reductions in the fees charged by competing ad exchanges. Third, my own analysis of Google and third-party data corroborate AdX's stable and high fees.

(499) **Google documents and internal analyses.** Since approximately 2012, Google has charged a roughly 20% take rate or fee for Open Auction impressions bought through its ad exchange.[714] AdX's take rate for Open Auction transactions was 19.8% in 2012 and 19.3% in 2015;[715] it returned to 19.8% by the first quarter of 2018.[716]

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to operate an exchange. If you built an exchange from scratch in today's environment where ML is everywhere, by having like a small volume of transactions scale, all of your optimization decisions would likely be wrong, which would not make you very competitive. So even if you were able to raise the capital to build the exchange, that exchange would likely not be performing for years, and that would imply that you have every DSP integrated which also takes years. And then you're running into a marketplace that's attempting to commoditize itself, which means the value of that business over time will shrink. So mathematically I'd say the odds are very much stacked against a new exchange coming into the market, but anything is certainly possible. Q. And you referenced ML everywhere. What is ML? A. Machine learning. It's a more advanced form of optimization. Many of the tech next at ad tech historically were done very manually and are now far more automated.").

[714] GOOG-DOJ-12700111, at -112(12/19/2018) (An email from LaSala to Bellack and others).

[715] GOOG-DOJ-03640993, at -009 (02/23/2016).

[716] GOOG-AT-MDL-019097789, at -807 (01/06/2023) (Google's response to the European Commission's RFI states, "Google's standard revenue share rate for Open Auction and Private Auction transactions is 20%, and Google's standard rate for Preferred Deal and Programmatic Guaranteed is 10%. To the best of the knowledge of current Google employees, prior to the introduction of new transaction types with different rates (Private Auction, Preferred Deal and Programmatic Guaranteed), Google's standard contractual rate was 20%."). *See also* GOOG-DOJ-03733834, at -870 ("AdX rev shares: OA holding steady", showing Open Auction transactions as the majority of AdX revenue).

(500) Google documents indicate that AdX tranasaction volume from its customers are not highly responsive to fees, and that lower fees would do little to increase market share, but would instead merely reduce AdX revenues, a fact that is, consistent with AdX possessing substantial market power.

(501) For example, a slide from a 2014 "Ad Platforms Pricing Review" (Figure 52 below) reports the "expected elasticity" of AdX for a reduction "in price today" from its 20% take rate to 15%.[717] The elasticity of demand for a product represents the percent change in quantity for a one-percent change in price.[718] The slide shows that the "total blended" average expected elasticity across customer groups is less than 1. This is known in economics as inelastic demand.[719] When demand is inelastic, a one percent change in price leads to a less than one percent change in quantity, implying that a one percent decrease in price reduces total revenues.[720] Consistent with this, the slide states, "[r]educing AdX rev share likely value destroying" for the majority of AdX's publishers with inelastic demand. As a matter of economics, inelastic demand refers to low customer responsiveness to price, and a firm facing inelastic demand at prices above its marginal cost will generally possess significant market power as it can increase prices from competitive levels without losing a large amount of demand.

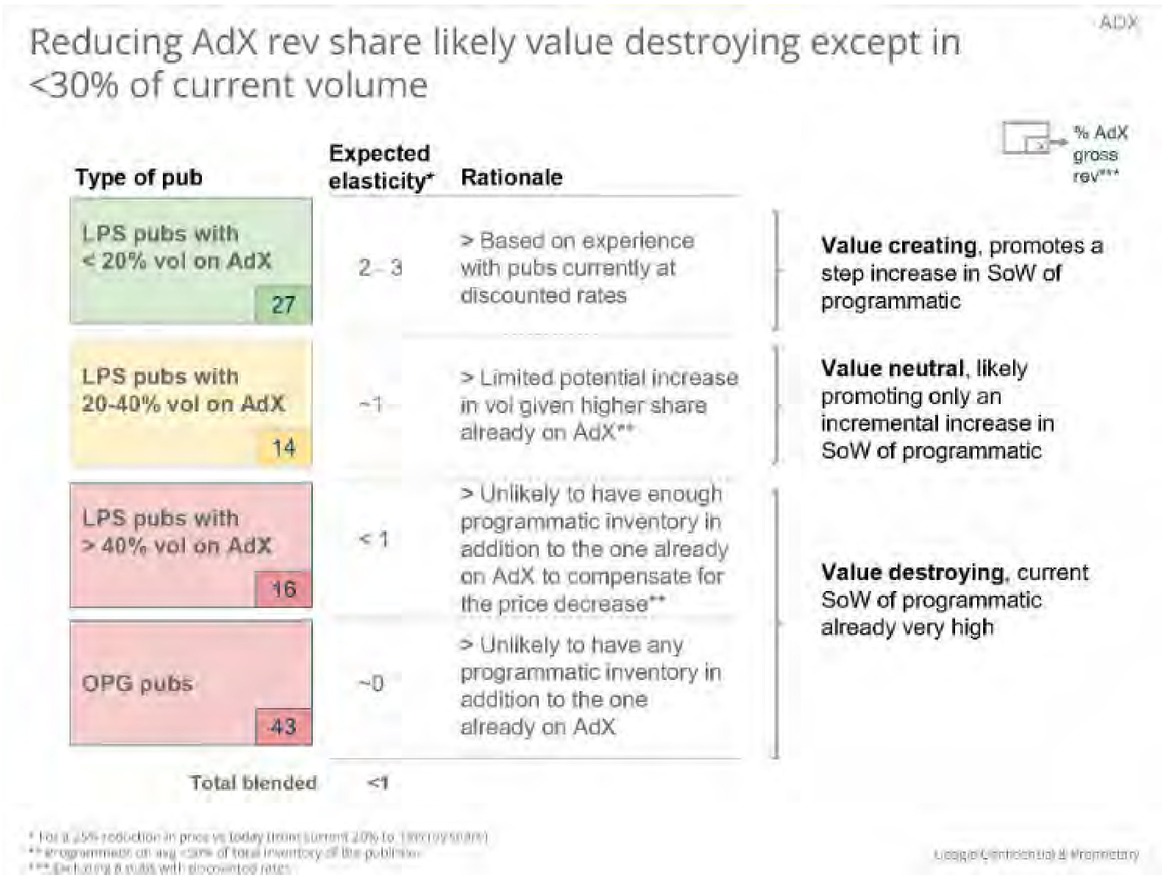
717 GOOG-AT-MDL-003839960, at -979 (07/08/2014) (July 8th, 2014, "Ads Platforms Pricing Review").

718 *See* Hal R. Varian, *Intermediate Microeconomics*, 9th ed. (New York: WW Norton, 2014), 274 ("The price elasticity of demand, ϵ, is defined to be the percent change in quantity divided by the percent change in price.").

719 *See* Hal R. Varian, *Intermediate Microeconomics*, 9th ed. (New York: WW Norton, 2014), 276 ("If the elasticity is less than 1 in absolute value we say it has an inelastic demand.").

720 *See* Hal R. Varian, *Intermediate Microeconomics*, 9th ed. (New York: WW Norton, 2014), 279 ("Thus revenue increases when price increases if the elasticity of demand is less than 1 in absolute value."). Analogously, a revenue *decreases* when price *decreases* if the elasticity of demand is less than 1 in absolute value.

Figure 52. Google analysis of AdX price elasticity (2014)



Source: GOOG-AT-MDL-003839960, at -979

(502) Moreover, a 2016 Google email chain discussed a simulation in which Google varied the take rates on AdX and GDN, indicating that reducing the AdX take rate from 15% to 10% to 5% while holding the GDN margin at 20% would reduce Google's gross and net revenues earned from AdX publishers on AdX, Google Ads, and DV360.[721] Figure 53 below presents a summary of the results, focusing on net revenues. The percentage changes in net revenue in the table are expressed relative to a baseline scenario with a 20% AdX take rate and 15% Google Ads margin. This simulation is again consistent with AdX possessing significant market power, as it indicates that—even accounting for Google's buy-side margins—a reduction in AdX take rates would reduce net revenue earned on AdX publishers.

[721] GOOG-DOJ-04615040, at -040 (11/14/2016) ("For gross revenue on AdX pubs, Adw, DBM, and other RTB buyers on AdX pubs make up 46%, 32%, and 22% of the total respectively. For net revenue, adw (including buy-side margin), dbm (including markup), and other rtb buyers make up around 50%, 35% and 15% respectively"), -043.

Figure 53. Results from a 2016 simulation varying Google Ads margin and AdX take rate on change in net revenues earned from AdX publishers

AdX take rate	Google Ads margin				
	15%	20%	25%	28%	32%
0%		-52.43%			-28.96%
5%		-37.83%		-22.05%	
10%		-22.92%	-15.04%		
15%		-7.69%			
20%	0.00%				

Source: GOOG-DOJ-04615040, at -043. The table represents the change in net revenues earned from AdX publishers on AdX, Google Ads, and DV360 relative to the baseline scenario of 15% Google Ads margin and 20% AdX take rate.

(503) **AdX charges supracompetitive fees and sustains higher fees than other ad exchanges**. Numerous Google documents indicate that AdX charged higher take rates than rival ad exchanges and was able to sustain those prices even after other exchanges lowered their take rates.[722] For example, a July 2018 "Sell-side Pricing Strategy Review" document noted that, "our revshare (20%) is much higher than other exchanges (generally 10%)," and that "DRX's 20% rate is problematic for DBM and AdX buyers as well, because as discussed, it is significantly higher than the competition."[723]

(504) Additionally,

- When discussing the 2016 simulation described above regarding AdX's margins, Tobias Maurer, Product Manager at Google, characterized a *lower* AdX take rate as one that is at a "more competitive level," implying that 20% is not a competitive take rate.[724]

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722 *See* GOOG-TEX-00106259, at -259–260 (11/04/2017) (An email chain among senior Google ad tech executives which contains a discussion of an article published by *AdExchanger* about Rubicon eliminating buy-side fees; in the email chain, the executives also describe how AdX's take rate is substantially higher than that of rivals like Rubicon and AppNexus. Payam Shodjai states, "Rubicon's take home will be around 10% to 12% next quarter according to the article. If you look at what Amazon is doing . . . and header bidding, there will be even more pressure on the 10%. I think SSP margins will stabilize at around 5%." Eisar Lipkovitz later replies, "While true that 20% for just sellside platform/exchange isn't likely justified by value, I equally don't think Rubicon or AN [AppNexus] can run an actual business with 5% or even 10%." Jim Giles concludes, "I think the other important thing to keep in mind versus most SSPs is that we also have the ad server. I think pure SSP is definitely commoditizing… I think the combination of ad server / exchange plus data gives us cover for total costs that are higher than other exchanges."), GOOG-DOJ-03640993, at -010 (02/23/2016) (A Google presentation which reports take rates for AdX and some third-party exchanges, indicating that Google ("DoubleClick AdExchange") charges 20% for open auction, 20% for private auction, and 10% for programmatic direct and programmatic guaranteed transactions; that Rubicon charges 10-20% for open auction and 5-12% for private auction and programmatic guaranteed transactions; that AppNexus charges approximately 8% across all deal types; that Facebook (Liverail) charges 10-20% for open auction and 4-10% for programmatic direct; and that MoPub (Twitter) charges 20% for open auction, private auction, and programmatic direct transactions.).

723 GOOG-DOJ-AT-02118579, at -581–582 (07/11/2018) (Google "Sell-Side Pricing Strategy Review," July 11, 2018).

724 GOOG-DOJ-07817544, at -545 (11/09/2016) ("I think there is a case to be made for moving some margin to buy-side and communicating that our sell-side margin dropped to more competitive level (15% [AdX], 20% [GDN] option on the slide)"). *See also* GOOG-DOJ-11772703, at tab "Notes" (10/2016) (An internal Google document studying potential AdX take rates characterized a hypothetical 10% take rate as matching "Index Exchange rate, which we are told is comfortably profitable.").

- In a January 2017 email chain, Director of Publisher Ad Platforms at Google Jonathan Bellack noted, "If everyone else is at 20 we can justify 20. We never originally intended to have AdX as a premium over other exchanges, that was the market price. Now that Index is at 10% and AppNexus is offering 5% at least as a promotion, the question is whether we can defend a 50% or 100% premium (15-20% vs 10%). . . I do not think it is feasible to try to defend a 3-4x (15-20% vs 5%) on third party AdX buyers."[725]
- In email correspondence from November 2016, Google employees discussed Rubicon's offer to publishers to move from 15% revenue share to a flat $0.05 CPM fee for sell-side margins. One Google employee noted that the move would mean "their margins will get closer to Index and other SSPs compared to AdX," and another provided reasons "why is Rubicon doing this and therefore why should we not do it," including "they [Rubicon] don't own an Adserver, so their primary deal-making engine is to convince a publisher to put their SSP in a better/exclusive position within someone else's stack."[726] That is, without its own publisher ad server, Rubicon would have to convince a publisher to prioritize its exchange within another server (e.g., DFP) to gain transaction volume. In contrast, AdX already possessed privileged access to inventory through DFP (see Section VII.D.1), and hence could support a higher take rate.

(505) Third party documents and depositions also indicate that rival exchanges charged lower take rates than AdX.[727] Moreover, competitors and publishers described an inability to affect or negotiate AdX fees. For example,

- Rubicon's quarterly financial reports indicate that its take rates were lower than Google's in 2018.[728] In 2023 (after Rubicon merged with Telaria and was renamed Magnite), Magnite's Chief

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[725] GOOG-DOJ-09470144, at -145 (01/30/2017).

[726] *See* GOOG-DOJ-05314741, at -741–744 (11/22/2016).

[727] *See also* Sarah Sluis, "OpenX Lays Off 100 Employees And Pivots To Video," AdExchanger, Dec. 18, 2018, https://www.adexchanger.com/platforms/openx-lays-off-100-employees-and-pivots-to-video/ ("To compete, OpenX's competitors have lowered take rates. This strategy disadvantages OpenX which, sources say, often charges fee close to 20%, on par with Google. But Rubicon Project charges 12, and AppNexus averaged 8.5% a year ago."

[728] In particular, Rubicon indicated that its take rate was 11.8% in 2018Q1 (Rubicon Project, *Financial Highlights: Q1 2018*, May 3, 2018: 4, https://investor.magnite.com/static-files/53bd6f86-a6e5-4dd9-af5d-97b60770510e), 12.1% in 2018Q2 (Magnite, "Rubicon Project Reports Second Quarter 2018 Results," August 1, 2018, https://investor.magnite.com/news-releases/news-release-details/rubicon-project-reports-second-quarter-2018-results), 12.3% in 2018Q3 (Magnite, "Rubicon Project Reports Third Quarter 2018 Results," November 7, 2018, https://investor.magnite.com/news-releases/news-release-details/rubicon-project-reports-third-quarter-2018-results), 13.8% in 2018Q4 (The Motley Fool, "The Rubicon Project (RUBI) Q4 2019 Earnings Call Transcript," February 26, 2020, https://www.fool.com/earnings/call-transcripts/2020/02/27/the-rubicon-project-rubi-q4-2019-earnings-call-tra.aspx), and 14% in the full year of 2019 (The Motley Fool, "The Rubicon Project (RUBI) Q4 2019 Earnings Call Transcript," February 26, 2020, https://www.fool.com/earnings/call-transcripts/2020/02/27/the-rubicon-project-rubi-q4-2019-earnings-call-tra.aspx). Several of these financial reports indicate that Rubicon cut take rates between 2017 and 2018 (For example, the report for 2018Q1 indicates that Rubicon's take rate in 2017Q1 was 23.7%. (Rubicon Project, *Financial Highlights: Q1 2018*, May 3, 2018: 4, https://investor.magnite.com/static-files/53bd6f86-a6e5-4dd9-af5d-97b60770510e). In February 2021 (after Rubicon merged with Telaria and was renamed Magnite – *see* Sarah Sluis, "Meet Magnite, The Post-Merger Name For Rubicon Project And Telaria," *AdExchanger,* June 30, 2020, https://www.adexchanger.com/platforms/meet-magnite-the-post-merger-name-for-rubicon-project-and-telaria/) Magnite's CFO stated on the 2020 end-of-year earnings call that "[G]iven the significant and growing competitive

Product Officer testified that AdX can charge higher take rates than Magnite because Google "can command whataver take rate they so chose [sic]."[729]

- Similarly, Trade Desk Executive Vice President John Dederick has said that while his negotiations with Google over AdX rates are "sort of a take it or leave it relationship," his negotiations with other exchanges are "much more reasonable" because there's a "fairer balance of power."[730]
- Ryan Pauley, President of Revenue and Growth at Vox (an open-web publisher), has said that Vox has "limited leverage" when negotiating AdX take rates because Vox does not "currently have any reasonable alternatives' to AdX's Open Auction demand.[731] In contrast, he says that his team has "been able to negotiate more favorable rev shares for Vox Media from other partners, typically."[732]
- OpenX CEO John Gentry identifies Magnite and PubMatic as the exchanges most impacting how OpenX sets its open auction display take rates because they "have been aggressive about lowering fees for advertisers as a means of differentiation."[733] In contrast, he says, "to the best of my knowledge, my memory, I have never heard any advertiser, buyer, or holding co tell us that Google AdX was providing a lower rate than us in the marketplace."[734] OpenX would not attempt to take market share from AdX because, according to Gentry, "we're not ever going to convince a publisher to drop AdX and keep us in and we're never going to convince a buyer to not buy on Google and buy only on us."[735]

(506) AdX's take rate has remained largely constant over time even though other ad exchanges have reduced their take rates. A March 2018 Google internal presentation highlighted this trend in other

sensitivity related to our take rates, we will not be providing specific ad spend and take rate figures going forward. From a qualitative perspective, however, [our] take rates remain stable" (The Motley Fool, "Magnite, Inc (MGNI) Q4 2020 Earnings Call Transcript," February 24, 2021, https://www.fool.com/earnings/call-transcripts/2021/02/24/magnite-inc-mgni-q4-2020-earnings-call-transcript/).

729 Deposition of Adam Soroca (Magnite), August 31, 2023, 60:17–61:20 ("Q. And how does Magnite's open auction display take rate compare to that? A. Our take rate is lower. Q. Approximately how much lower? A. Our take rate for open auction is approximately [redacted]. Q. And do you have a view on why Google's take rate for its AdX product is higher than yours, how are they able to kind of bear that in the market?. . . A. My view of that would be that they get -- they can command whatever take rate they so chose. Q. And can you elaborate on that? Why do you think that? A. They are not held to the same transparency standards that we are on the buy side of the business. And they have the ability to win inventory or they had the ability to win inventory at whatever take rate they put out there. Q. Could you elaborate on why transparency has something to do with take rate?. . . A. So buyers, particularly the largest agencies and the largest marketers, went through a wave of demands from companies like Magnite to declare and report against our take rate. Q. And is that not the same for AdX?. . . A. AdX -- my understanding is that AdX would not engage in those conversations and didn't have to negotiate those rates.").

730 Deposition of John Dederick (The Trade Desk), Jul. 28, 2023, 164:2–165:17.

731 Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 12:8–13:24.

732 Deposition of Ryan Pauley (Vox), Aug. 23, 2023, 13:25–14:25.

733 *See* Deposition of John Gentry (OpenX), Oct 26, 2023, 94:4–16.

734 Deposition of John Gentry (OpenX), Oct 26, 2023, 94:17–25.

735 *See* Deposition of John Gentry (OpenX), Oct 26, 2023, 99:11–18.

exchange's fees, noting "margin compression" as a result of header bidding and smarter buyers.[736] The same presentation observed that in 2017, Rubicon (now Magnite) slashed its take rate in half and that AppNexus (now Xandr) reduced its take rate "even further" to [redacted].[737]

(507) Payam Shodjai, at the time Google's Director of Product Management for Display and Video Ads, in a 2017 internal email chain wrote that "the technology, demand and supply that SSPs offer have been commoditized to a large extent," and that, "I think SSP margins will stabilize at around 5%. Maybe it will happen by this time next year or in early 2019."[738] However, as I show next, AdX's take rates have remained well above this level.

(508) **Analysis of data.** The aforementioned take rate patterns described in documentary evidence and testimony are also present in the data. Figure 54 plots take rates for AdX and a set of third-party exchanges from which I obtained data on gross and net revenues between January 2018 and December 2022 (shown in the colored lines, with the take rate scale on the left); the figure also plots AdX's market share of worldwide indirect open-web display impressions among exchanges (in the grey shaded area, with the market share scale on the right). During this period, AdX's take rate remained stable at 20%, and AdX maintained a high (approximately 50–60%) market share of worldwide open-web indirect impressions among ad exchanges.[739] As noted in the figure legend, none of the exchanges depicted had a greater than 6% share of these impressions in 2022.

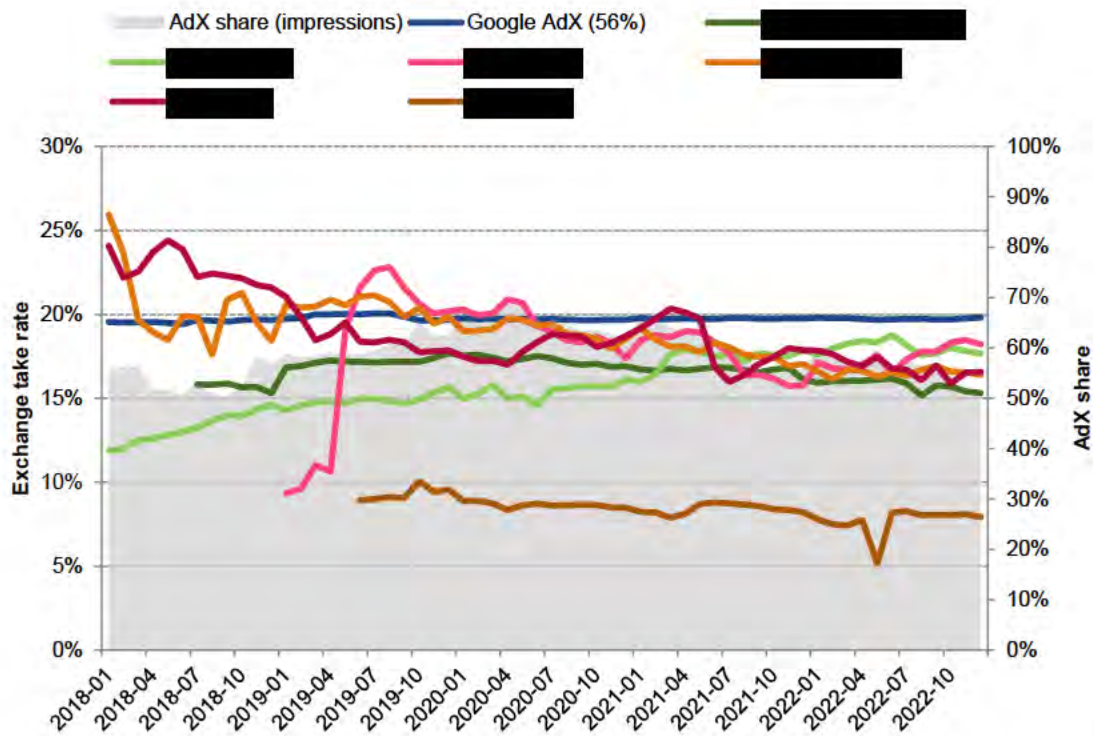
[736] *See* GOOG-DOJ-05285023, at -044 (03/2018).

[737] *See* GOOG-DOJ-05285023, at -044 (03/2018).

[738] *See* GOOG-TEX-00106259, at -260 (11/04/2017) (Mr. Shodjai also wrote, "I also don't think we should try to milk our margins for as long as we can (whether it's through AdX or Demand Product), because we would be prioritizing short-term profits over long-term profits," also consistent with AdX's 20% fee being above competitive levels); Payam Shodjai, "Payam Shodjai," LinkedIn, https://www.linkedin.com/in/pshodjai/.

[739] When limited to impressions served to US users, AdX maintains a high market share and a stable 20% take rate throughout this period, higher than the weighted average take rate among third-party exchanges. See Figure 109 in Appendix E.1.

Figure 54. Worldwide open-web indirect display take rates for ad exchanges, and AdX's worldwide indirect open-web display market share (2018–2022)

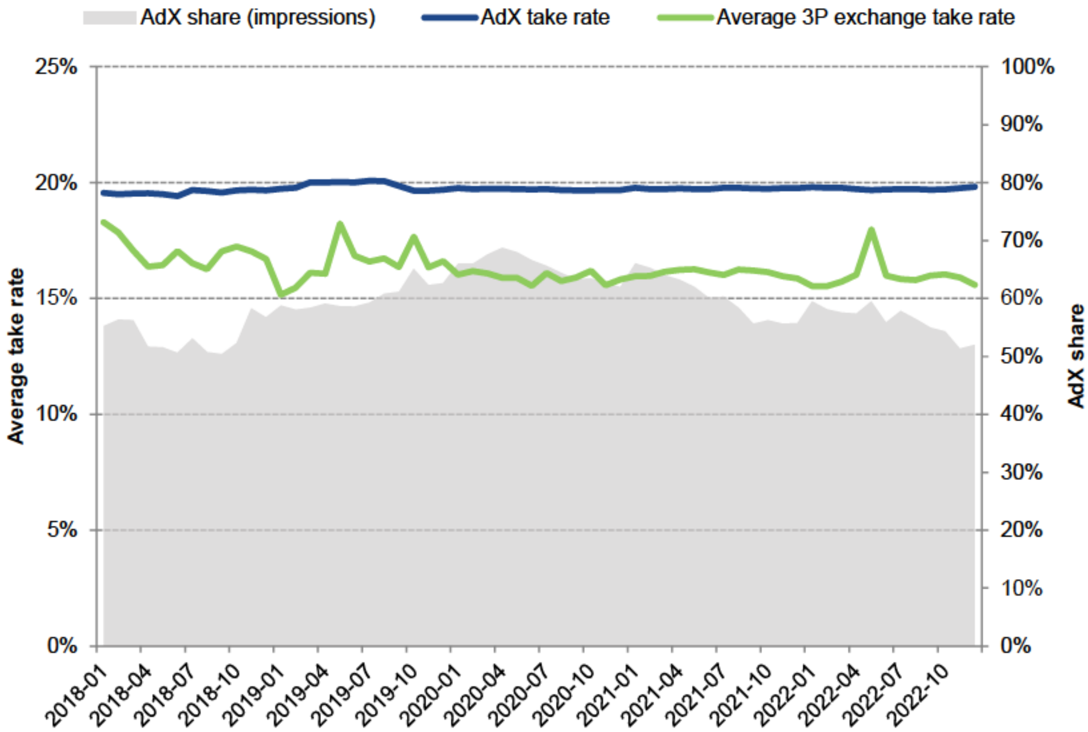


Source: Exchange data panel (*See* Appendix H.1.c for details).
Notes: Limited to open-web display advertisements transacted through indirect transactions (including open auction, private auction, or header bidding). For take rates, I exclude observations where ad type, transaction type, or channel is unknown. The chart above includes all exchanges that produced both gross and net revenue data, excluding exchanges that never exceed 1% of impressions in the exchange market in any given year during the data period, limited to indirect open-web display transactions excluding unknown values (these exchanges are [redacted]). Monthly average take rates are computed as reported net revenue divided by gross revenue.
The legend in the chart above lists each exchange with its share of worldwide indirect open-web display impressions in 2022 in parentheses. "AdX share (impressions)" (shaded grey area in chart) is AdX's share of worldwide indirect open-web display impressions. *See* Figure 47 and Appendix H for details.

(509) Figure 55 below plots AdX's take rate against the weighted-average take rate among third-party exchanges for 2018 – 2022, alongside AdX's share of worldwide indirect open-web impressions.[740] During this time period, AdX maintained consistently high market share of impressions and net revenues, while maintaining a consistently higher take rate than the average of its rivals.

[740] Note that while Figure 54 excludes exchanges that never exceed 1% of impressions in a given year, the weighted average take rate presented in Figure 55.is calculated across all third-party exchanges that produced both gross and net revenue data. The third-party exchanges that are included are OpenX, Index Exchange, Magnite, Xandr, Sovrn, Sharethrough, Yieldmo, DCN, Zedo, and PubMatic.

Figure 55. Worldwide open-web indirect display take rates for AdX and third-party exchanges (average), and AdX's worldwide indirect open-web display market share (2018–2022)



Source: Google AdX data (DOJ RFP 53); Exchange data panel (*See* Appendix H.1.c for details).
Notes Limited to open-web display advertisements transacted through indirect transactions (including open auction, private auction, or header bidding). "Average 3P exchange take rate" is the monthly weighted average take rate by exchange spend among all third-party exchanges that produced both gross and net revenue data. "AdX share (impressions)" (shaded grey area in chart) is AdX's share of worldwide indirect open-web display impressions. *See* Figure 47 and Appendix H for details.

(510) The ability of Google to maintain a constant 20% take rate and maintain a high market share in the ad exchange market despite lower fees charged by rivals, and in an industry that observers have described as an increasingly commoditized market,[741] is consistent with AdX's substantial and sustained market power.

[741] *See, e.g.*, Ronan Shields, 'Fundamentally, the SSP business is not very attractive': The fall out of ad tech's latest round of closures," Digiday, February 13, 2023, https://digiday.com/media/fundamentally-the-ssp-business-is-not-very-attractive-the-fall-out-of-ad-techs-latest-round-of-closures/ ("Ari Paparo, founder of Marketecture, told Digiday that Yahoo's cutbacks were to be expected given the ongoing challenges the sellside of the market faces as the buy-side of the industry seeks to downsize the number of players they work with." 'I think that, fundamentally, the SSP business is not very attractive … It's not growing, and it's very competitive as publishers really treat you like a commodity, they have like 10 or 20 of them implemented on every page,' he added. 'And it's becoming less attractive because it's under pressure from the buy-side who's using SPO [supply-path optimization] to reduce the number of paths that they're buying from. And also, you have, advertisers and agencies running bake-offs on the supply side to have preferred relationships, this all favors the biggest SSPs in a consolidating business.'").

V.C.3.b. Google is able to significantly deviate from competitive behavior in the ad exchange market

(511) Evidence that Google has substantial and sustained market power in the ad exchange market includes its ability to meaningfully deviate from competitive behavior in that market.

(512) As noted above, in a competitive market, a firm loses significant sales if it degrades the quality of its product, all else equal. In the ad exchange market, Google has degraded the quality of AdX in a manner that favors its other ad tech products by restricting the access and use of real-time bids from AdX by third-party publisher ad servers.[742] This policy discouraged publishers from using rival publisher ad servers, but it also restricted access to the supply of inventory available for AdX to buy on non-DFP servers. In a competitive market, an ad exchange (all else equal) would not likely be able to profitably restrict access to the supply of inventory available to its advertiser customers, as doing so would risk losing a large amount of its transaction volume to ad exchange rivals that did not impose such restrictions.

(513) Google limiting AdX's real-time bids into rival publisher ad servers is consistent with Google's ability to deviate from competitive behavior in the ad exchange market. I discuss this conduct further in Section VII.C.

(514) Moreover, Google's ability to substantially price discriminate in the ad exchange market is also consistent with it possessing substantial market power. With AdX Dynamic Revenue Sharing (AdX DRS), launched in August 2015 and persisting until September 2019, Google changed the take rate that AdX levied at the impression (or query) level. Experiments run in 2014 indicated that AdX DRS increased auctions won, revenue, and profit.[743] According to Google, assuming "an agreed upon aggregate revenue share of 20% with a GAM publisher," AdX was able to charge a take rate as high as 40% "on a per-query basis."[744] The ability to essentially double the take rate on a given query from the average fee is consistent with the possession of substantial market power.

(515) Similarly, Google's Reserve Price Optimization (RPO) program, launched in April 2015, also demonstrates AdX's substantial market power.[745]

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742 *See* Section VII.C on Google's exclusive provision of unrestricted access and use of real-time bids from AdX to DFP.

743 GOOG-DOJ-14712011, at -013 (12/04/2014) ("The number of winning auctions increase, and so do revenue and profit."). *See also* Section VII.D.1, where I discuss AdX DRS in more detail.

744 *See* GOOG-AT-MDL-006217592, at -593 (12/12/2022) (Google's response to the European Commission's RFI states, "On a per-query basis, and assuming an agreed upon aggregate revenue share of 20% with a GAM publisher: (a) In the initial version of Dynamic Revenue Share, the minimum revenue share applied was 0% and the maximum revenue share applied was 20%. (b) In the second version of Dynamic Revenue Share (launched in December 2016), the minimum revenue share applied was 0% and the maximum revenue share applied was 40%, but the objective was to keep the average revenue share at 20% over queries.").

745 GOOG-AT-MDL-009013263, at -263 (05/01/2015) ("In April 2015, AdX launched buyer based RPO. In this version we use bid predictions based on the combination of publisher, inventory unit and buyer to set dynamic reserves."). Later that year on October 5th, Google launched "Cookie based RPO" which "set different reserve for every query based on

(516) In Section III.E, I described how a seller can increase its expected revenues in an auction by using a reserve price.[746] As described by Google, RPO "has been a successful project for increasing publisher revenue in second price auctions" and worked by computing reserve prices "based on historical bids and applied in the AdX auction to increase the clearing price of matched queries."[747] As opposed to using information on bids from the current auction to adjust AdX's margin (as in AdX DRS), RPO used historical bid information to dynamically set reserve prices for subsequent auctions.[748] Notably, Google Ads was exempted from RPO on AdX.[749]

(517) When launched, RPO meaningfully increased revenue from AdX buyers by increasing dynamically the reserve price they would face.[750] A 2017 Google document noted a "key goal" of RPO "is to exploit the gap between the winning bid and the transaction price by inserting a (higher) reserve price between the two thereby inducing the winner to spend more."[751] To increase publisher yields and payouts, RPO raised prices that advertisers using non-Google bidding tools paid for impressions transacted through AdX.[752] A Google executive noted in a December 2016 email that AdX would be

the buyer and cookie" *See* GOOG-AT-MDL-009644098. *See also* GOOG-AT-MDL-009013186, at -187 (05/26/2015). In early 2018, an "online" version of RPO was launched (GOOG-DOJ-15211461), in which Google uses "live" cookie data to update predictions (GOOG-AT-MDL-009013427, at -427). RPO was discontinued with the transition to first-price auctions (GOOG-AT-MDL-010514506, at -507, "1P RPO is more complicated and could not be done in time for 1P Auction, but we believe this optimization is crucial for 1P yield long-term."), but relaunched as first-price RPO for a subset of web transactions in June 2022 and expanded to remaining GAM web traffic in January 2023 (GOOG-AT-MDL-009644610, GOOG-AT-MDL-013281679).

746 In a second-price auction, the reserve price affects the auction price when the reserve price is between the highest and second-highest bids. In a first-price auction, a reserve price tends to reduce bid-shading and increase submitted bids.

747 *See* GOOG-AT-MDL-009832160, (n.d.). *See also* GOOG-AT-MDL-009013192, at -194 (03/14/2016) ("Dynamic Price V1 (launched in April'15)… Pick revenue-optimal reserve for given bid distribution… Bucketing by web_property, adslot_code, mobile_browser_class [,] buyer_newtork_id p.] Apply floors trained on yesterday's data to today's traffic.").

748 GOOG-AT-MDL-B-002097533, at -533 (04/2015) (April 2015 email from Google employee Ali Amini, "I think with RPO we moved into a new world that as a buyer, your current bids can be used against you in the future. With DRS, as a buyer your current bid can be used against you in the current auction.").

749 RPO initially exempted buyers at the query-level if they (i) set a minimum CPM value greater than 0, or (ii) submitted two or more open auction bids and had not removed self-second pricing. *See* GOOG-AT-MDL-009013505, at -506 (12/12/2017) ("we chose to exempt buyers that second price themselves from RPO"). In November 2017, Google changed this policy. *See* GOOG-AT-MDL-009013510, at -510 (11/14/2017) ("[i]n this launch we are changing the exemption policy to be based on a periodically computed whitelist of buyers. In order to get on the whitelist, a buyer needs to generate a certain amount of revenue lift via voluntary self-pricing. The amount of revenue lift required to get on a whitelist will be set to be a multiple of what RPO can provide on average for all buyers."). *See also* GOOG-AT-MDL-B-002115457, at -458 (11/09/2017) ("the idea is to check if the minimum payments over a day actually result in significant revenue lift… If they do provide 'significant' increase in payments from a buyers ('considerably' higher than the average lift generated by RPO), then we exempt the buyer for the following day. As you would imagine, there's no change for AdWords (since you're not abusing the current mechanism to gain the system), but we do see an increase in AdX buyer revenue.") and GOOG-AT-MDL-009013505, at -507 (12/12/2017).

750 GOOG-AT-MDL-009013263, at -263 (05/01/2015) ("This launch generated 4.5% incremental revenue from AdX (RTB+Hosted Bidding) buyers (About +0.85% on Adx+AdSense publishers overall).") According to a 2016 document, "[o]n [AdX] Open Auction, buyers pay less than half of what they bid, on average. GOOG-AT-MDL-009013430, at -434 (05/09/2016). By February 2017, RPO was generating a lift of "over USD 300 million annually" and by 2019 the estimated incremental effect of RPO was $500 million/year. *See* GOOG-AT-MDL-009013418, at -418 (02/2017) and GOOG-AT-MDL-010514506, at -507 (07/12/2020).

751 GOOG-AT-MDL-009013418, at -418 (02/2017).

752 According to a 2016 document, RPO "effectively reduces the gap between the first price and closing price increasing

able to "reclaim" lost revenue "through more aggressive RPO tactics."[753] In July 2018, Google launched "Truthful DRS," which adjusted reserve prices for some transactions such that AdX would pay the publisher less than the dynamic reserve price that it would set in the auction; in those cases, Google could recollect its lost profit via the difference between the RPO price and the next highest price in the auction.[754]

(518) When discussing RPO Ali Nasiri Amini (then a senior staff scientist and current Google Vice President of Engineering) noted that, "[i]n an opaque market place [the] auctioneer tries different tricks to squeeze more money from buyers and their agents."[755] In a competitive market, AdX would not have been able to "squeeze more money" from advertisers without losing significant business to alternative ad exchanges. It is precisely because AdX possesses substantial market power that it is able to control prices for certain transactions and collect higher fees.

V.D. Google possesses substantial and sustained market power in the advertiser ad network market

(519) Google's advertiser ad network, Google Ads, is the largest advertiser ad network for open-web display advertising, and possesses substantial market power. In this section,

- I first describe key sources of Google's market power in the advertiser ad network market (Section V.D.1), which include its unique access to advertiser demand and publisher inventory (including Google's O&O properties and open-web AdSense publishers) and significant scale advantages over competitors.
- I then provide measures of Google Ads' market shares and discuss barriers to entry and expansion in the advertiser ad network market (Section V.D.2). Google Ads' market share among advertiser ad networks that I have data for has been over 65% or higher since 2018 for both impressions and fees among worldwide open-web indirect display transactions.
- Last, I provide direct evidence of Google Ads' market power (Section V.D.3). This includes:

publisher yield" and "will never set a price below an existing floor [set by the publisher]." *See* GOOG-AT-MDL-009013430, at -432–433 (5/9/2016).

[753] GOOG-TEX-00000655, at -660 (12/15/2016) (An email from Google Jim Giles noting that "we aren't actually losing much money by giving [Last Look] up" with Exchange Bidding, stating: "reclaiming what money we lose is completely under our control through more aggressive RPO tactics".).

[754] GOOG-AT-MDL-009644404 ("By adjusting reserve prices down dynamically we effectively adjust AdX's profit margin from full margin to low margin to match more queries. The lost profit on these transactions will be recollected from the price gap between RPO price (and optionally buyer's self min_payment) and the next highest price (we charge buyer RPO price+revshare and pay publisher less than RPO price).").

[755] GOOG-AT-MDL-B-002097533, at -534 (04/26/2015) (An email from Google employee Ali Amini).

V.D.2.a. Market shares

(526) Whether measured by impressions or fees, Google Ads has a very high share of the advertiser ad network market.[765]

(527) Even as far back as 2013, Google reported its GDN product (containing Google Ads) to have a 37% market share among ad networks with a 18% year-over-year growth (see Figure 44 in Section V.B.2.a from a May 2013 presentation).[766] In the same presentation, Google described its network, alongside AdX, as one of its "cash cows" and "still the big gorilla at $6B."[767]

(528) Google Ads' high share of impressions and fees for advertiser ad networks is supported by analysis of data produced in this matter.[768] As I show below, Google Ads also has a substantial share of impressions even among all advertiser bidding tools, which includes DSPs and advertiser ad networks.

(529) Below, I present market shares based on impressions and net revenues (see discussion in V.C.2.a).

(530) **Impressions.** Figure 56 below shows Google Ads' share of worldwide indirect open-web impressions from 2018 – 2022 among three advertiser ad networks for which data was produced: Google Ads, Criteo, and Facebook Audience Network (FAN). To my understanding, these are the meaningful competitors in the advertiser ad network market over this time period.[769, 770] During this period, Google Ads maintained an annual share of worldwide indirect open-web display impressions among these three advertiser ad networks consistently above 85%.[771]

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765 Beyond Google Ads' large share of display advertising transactions, deposition testimony from a Google executive notes that Google Ads has significant usage among top advertisers *See* Deposition of Tim Craycroft (Google), August 15, 2023, 169:6–169:13 ("Q. Who are some of your largest customers of Google ads -- Google Display ads? A. I don't know the top ten, but go down the list of the largest advertisers in the world or the country and you're just going to see the same. It's the big CPG companies. It's the big retailers. It's the big telecom, big media and entertainment companies.").

766 *See* GOOG-DOJ-04445011, at -014 (05/2013) (Google presentation, "2013 Global Media & Platforms Business Update"). *See also* GOOG-TEX-00101777, at -782 (A 2010 Google presentation describing "GDN the Largest Display Network in A Still Fragmented Market.").

767 GOOG-DOJ-04445011, at -015 (05/2013) (Google presentation, "2013 Global Media & Platforms Business Update").

768 I include spending shares in the advertiser ad network market in Appendix 0, and show that Google Ads' share of spending in the advertiser ad network market is also significant.

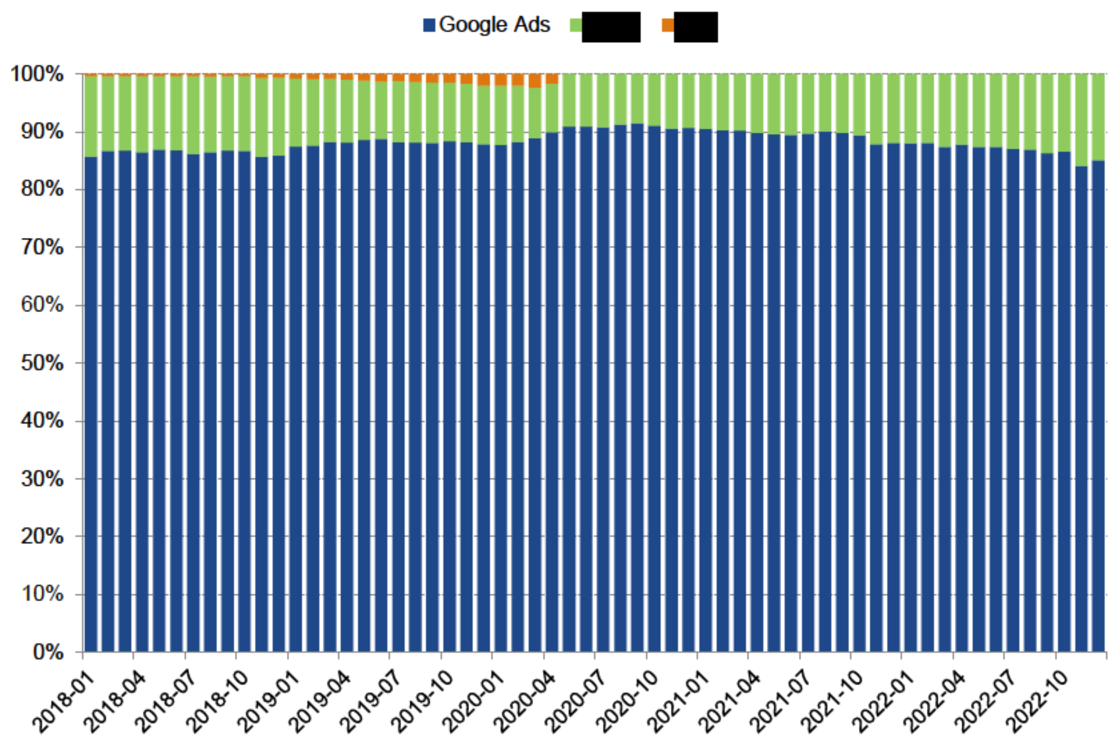
769 While Criteo offers some functionalities that are common to DSPs, it also provides advertisers with advertiser ad network features, such as CPC-to-CPM pricing (*see* Section IV.E). As a result, to be conservative, I include Criteo in my calculations of market shares for the advertiser ad network market. FAN stopped transacting advertising sales with open-web publishers in April 2020. I include the transactions attributed to FAN through April 2020 in my analyses.

770 I do not have evidence that there are advertiser ad networks outside of Google Ads, Criteo, and FAN that facilitate open-web display transactions with meaningful impression or fee shares during this time period. However, for robustness, in Appendix D.2.a, I present shares figures that include estimates for total impressions and net revenues for all bidding tools for which data was not produced. By including impressions and net revenues from these bidding tools in calculations of market shares for advertiser ad networks, my approach is conservative: this approach still indicates that Google Ads possesses a large market share.

771 Note that this figure includes all indirect open-web display impressions that were transacted by advertiser ad networks, including those that were not transacted through ad exchanges and instead were transacted through other counterparties

(531) When restricting attention to indirect open-web display impressions from US advertisers or users among these three advertiser ad networks, Google Ads share is similarly high at approximately 90% throughout the sample period (88% in 2022).[772]

Figure 56. Google Ads has maintained a substantial share of worldwide indirect open-web display impressions among advertiser ad networks (2018–2022)



Source: Google Ads data (DOJ RFP 54); Bidding tools panel (*See* Appendix H.1.b).
Notes: Denominator includes open-web display impressions from Google Ads, [redacted] Impressions include all indirect open-web display transactions from these parties. [redacted] exited the open-web display market in April 2020.

(532) **Net revenues (fees)**. Google Ads also maintains a significant share of fees collected in the advertiser ad network market. In 2022, Google Ads accounted for 81% of worldwide net revenues from indirect open-web display transactions among Google Ads, Criteo, and FAN.[773] Limiting to fees collected

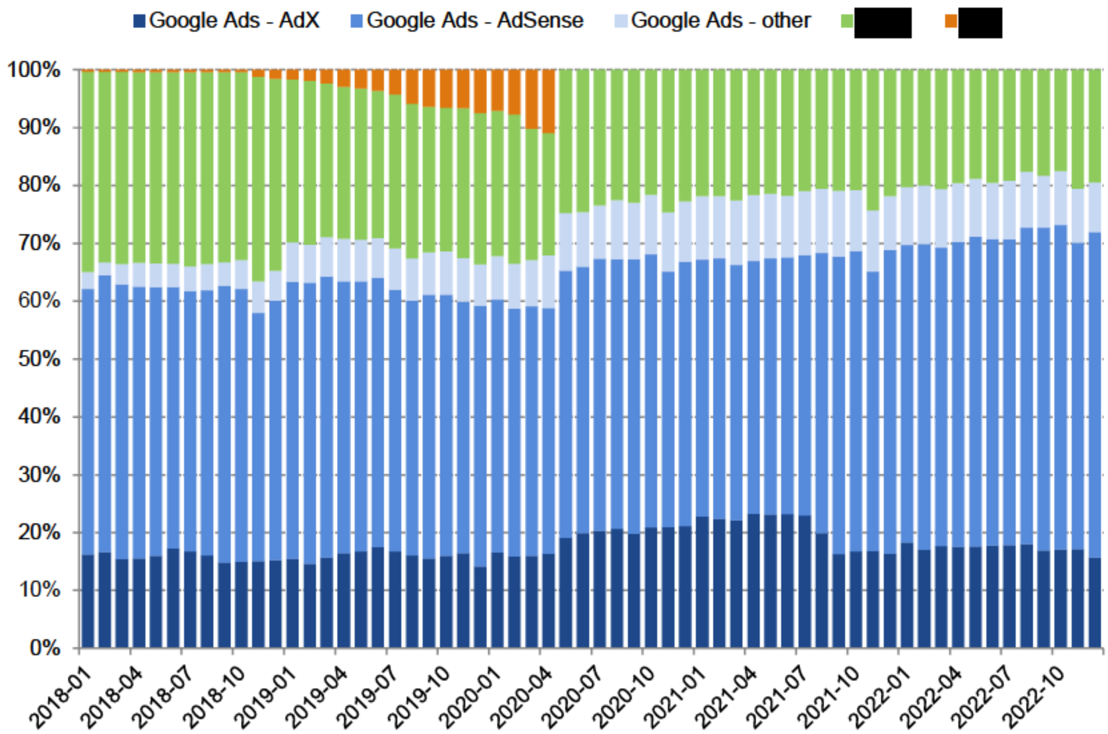
(including Google's AdSense). Even if I exclude impressions from Google Ads transacted through AdSense, Google Ads still comprises a significant share of worldwide indirect open-web impressions among advertiser ad networks, with a share exceeding 75% between 2018 and 2022. *See* Figure 97 in Appendix D.2.a.

772 *See* Figure 98 in Appendix D.2.a. Google Ads data (DOJ RFP 7 and DOJ RFP 54) only provide information on advertiser geography, while data from Criteo and FAN only provide information on user geography. Given this, I calculate shares among US advertisers or users. *See also* discussion in Section V.C.2.a regarding market share measures based on US users.

773 *See* Figure 97 in Appendix D.2.a. Impressions that are transacted from Google Ads to AdSense are subject to a 32% total take rate. *See* GOOG-DOJ-04004392, at -393–394 (2018) (Google "Sellside Guiding Principles" document).They are not disaggregated into separate rates for Google Ads and AdSense. In contrast, while Google Ads transactions through AdX also target roughly a 32% total take rate, this rate is split into a 15% margin for Google Ads and a 20% take for

from impressions served to US advertisers or users, Google Ads' share of net revenues among these three ad networks was 83% in 2022.[774]

Figure 57. Google Ads has maintained a substantial share of fees from worldwide indirect open-web display transactions among advertiser ad networks (2018–2022)



Source: Google Ads data (DOJ RFP 7, 54); [redacted] data ([redacted]); [redacted] data (Exhibit 8-07-R1).
Notes: 1. Includes net revenues from open-web display impressions from Google Ads (separated into transactions through AdX, AdSense, and other third-party exchanges), [redacted], and [redacted]. 2. Google aggregates buy-side and sell-side fees for transactions through AdSense ("Google Ads - AdSense" net revenues reflect a reported 32% take rate). 3. [redacted] exited the open-web display market in April 2020.

V.D.2.b. Barriers to entry and expansion

(533) There are substantial barriers to entry and expansion in the ad network market. These include:

- **Access to publisher inventory.** Due to indirect network effects, unless an entrant has access to publisher inventory, it will have difficulty attracting advertisers and compelling them to incur the costs of connecting to its services. As discussed in Section V.D.1 above, Google Ads has access to unique Google O&O inventory both within and outside of web display advertising. I also

AdX. The "GOOGLE ADS TO ADX" series in Figure 57 below reflects the 15% take rate for Google Ads transactions through AdX. However, because there is not a clear way to disaggregate Google Ads and AdSense take rates, the "GOOGLE ADS TO ADSENSE" series reflects the full 32% take rate. Appendix 0 includes a version of this figure where I assume that Google Ads collects a 15% take rate for impressions sold through AdSense.

[774] *See* Figure 98 in Appendix D.2.a.

discussed in Section V.B.2.b Facebook's acknowledged difficulties in accessing open-web publisher inventory for its advertiser ad network product.

- **Scale and data.** In addition, new entrants are disadvantaged by initially lacking scale. As I discussed in Section III.D.3, data is important for developing targeting algorithms and making predictions for offering CPC-to-CPM conversions, as well as running experiments used to evaluate new features and products. Advertiser ad networks also use large volumes of historical data to predict the probability that users will click on an ad.[775] As Google Ads executives explained in a 2017 presentation to the communications firm RingCentral, "All of these signals means we have a lot of data to work with … We're thus able to optimize with the same level of rigor that you would, but with exponentially more data, scale and precision."[776] Absent sufficient data, entrant ad networks would be competitively disadvantaged relative to existing ad networks.
- **Google's conduct.** As I discuss in Section VII.F.3, Google's conduct that impaired the competitiveness of non-Google ad exchanges and publisher ad servers impeded rival advertiser ad networks from accessing publisher inventory through non-Google products.

V.D.3. Direct evidence of Google's market power in the advertiser ad network market

(534) Direct evidence of Google's substantial and sustained market power in the advertiser ad network market includes:

- Google Ads' ability to charge supracompetitive fees and vary its targeted margins significantly across impressions, and Google's own analyses indicating that increasing fees would increase profits.
- Google's ability to restrict Google Ads' bidding on non-Google exchanges, thereby degrading the availability of publisher inventory for Google Ads' advertiser customers to benefit AdX.
- Google Ads, by either bidding into or withholding its demand from an ad exchange, meaningfully affects payouts through the exchange.

V.D.3.a. Google Ads is able to maintain supracompetitive fees, and vary its targeted margins to win more auctions, increase profits, and influence publisher behavior

(535) Google Ads targets a 15% margin with Google Ads on Open Auction transactions through AdX, and a 31-32% margin on transactions it facilitates through AdSense.[777] A July 2018 "Sell-side Pricing

[775] *See* Section III.D.3 for further details.

[776] GOOG-AT-MDL-004522085, at -088.

[777] *See* GOOG-AT-MDL-006218257, (12/16/2022) (Google response to the EC's RFI of October 31, 2022) at -264. GOOG-AT-MDL-000969513, at -525 (11/2020).

Strategy Review" document noted that, "AFC [Adsense for Content] and AdMob have not historically faced price pressure on their 32% revenue share."[778]

(536) Google has performed multiple analyses that show that Google can significantly increase Google Ads' margins while increasing Google's profit and net revenue earned on its ad tech products. These analyses, which are indicators of Google Ads' market power, include:[779]

- A March 2014 experiment found that an increase in Google Ads' margin from 14% to 15% (a 1 percentage point, or 7 percent increase) resulted in an increase in Google Ads' net revenues earned on AdX transactions.[780]
- The 2016 simulation described in Section V.C.3.a and depicted in Figure 52 and Figure 53 showed that for fixed AdX take rates, increases in Google Ads' margin would increase Google's net revenues earned on AdX publishers.[781]
- A simulation conducted by Google in May 2018 indicates that an increase in Google Ads' margin on AdX from 15% to 20% would increase Google's profit on "AdX web publishers" by 6.4%.[782] Figure 58 below from a Google document describing these simulations plots buy- and sell-side profit as increasing in Ads' margin (see plot on right, where profit increases as Google Ads' margin increases from 10%).

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[778] GOOG-DOJ-AT-02118579, at -580 (07/11/2018) (Google "Sell-Side Pricing Strategy Review,").

[779] *See* Section V.B.3.a for economic reasons why a firm with substantial market power may choose to price below its short-run or static profit maximizing level.

[780] *See* GOOG-DOJ-AT-02096186, at -186 (03/2014) (Google proposal "Increase GDN margin on AdX from 14% to 15%," states, "Recently the GDN margin on AdSense has come closer to 32%, therefore we propose to increase the GDN buy-side margin on AdX to 15%...."; The "Measured Impact" "For AdWords on AdX slice" reads, "GDN profit +5.3%" and "Google profit +2.2%", with "publisher payout -0.8%". The document indicates that GDN profit is computed only on AdX publishers. The document also indicates GDN profit represents "GDN's net revenues on AdX transactions", and "Google profit is the amount of money collected from advertisers minus the amount paid to the publisher.").

[781] *See* GOOG-DOJ-04615040, at -040, -043 (11/14/2016) (An email chain regarding simulation). For example, holding AdX's margin at 10%, an increase in GDN's fee from 20% to 25% would increase Google's net revenue by approximately 8% relative to its current levels (-22.92% to -15.04%).

[782] GOOG-DOJ-04736246, at -246 (05/09/2018) ("At 20% buy side margin, revenue goes down -0.9% (-$53M) but the overall (buy+sell side) profit increases 6.5% ($70M)"). An increase from 15% to 20% represents approximately a 33 percent increase in Ads' fee and a 16–17 percent increase in Google's total fee, from 30–32% to 35–37%. *See also* GOOG-DOJ-05277697, at -698 (05/10/2018) (A May 2018 email chain discussing this simulation which notes also "[w]e have been running an experiment [on AWBid] where we have been targeting roughly 5% more margin. It's showing ~$2M revenue and +$15M profit (on about $450M revenue)") and GOOG-DOJ-AT-02118579, at -581, (07/2018) (A July 2018 "Sell-side Pricing Strategy Review" document noting that, "simply increasing the GDN margin could generate meaningful net revenue improvements, based on an experiment with Web inventory.").

Figure 58. Results of Google's 2018 simulations that varied Google Ads margin relative to 15% on gross and net revenues earned on AdX web publishers

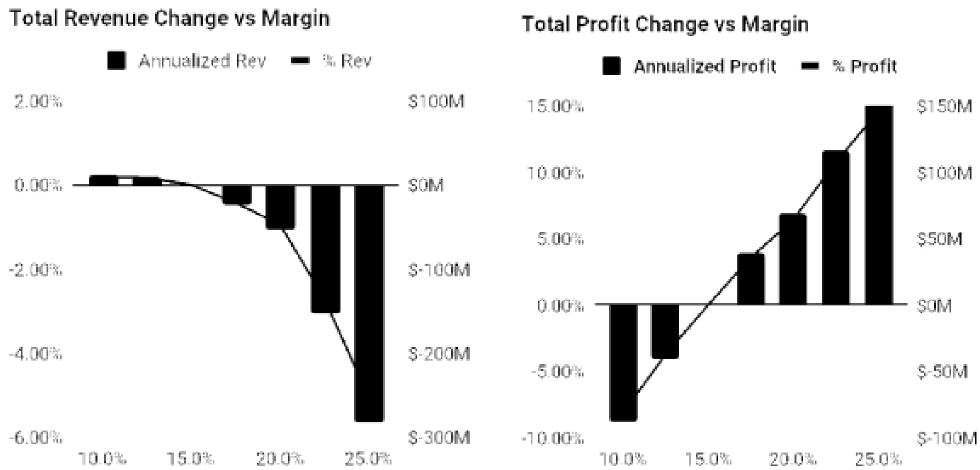


Figure 1: Total impact on revenue and profit relative to production. X-axis is the buy side margin, left Y-axis is the % change and right Y-axis is the annualized change.

Source: GOOG-DOJ-04736246, at -247. Change in gross revenue and net revenue on buy- and sell-side products earned on AdX web publishers.

(537) Google Ads' market power is also demonstrated by its bidding behavior into AdX auctions.

(538) Prior to the Uniform First Price Auction introduced in 2019, Google Ads (AdWords at the time) submitted two bids into the AdX auction.[783] Google documents indicated that this was "to prop up publisher payout" in AdX's second-price auction,[784] but would tend to increase the auction price paid by the winning Google Ads advertiser. According to a 2013 Google document, Google Ads' margin would be significantly higher (57% as opposed to 14%) if it did not submit two bids into AdX, and its "2nd bid accounts for ~50% of pub revenue, >$500M/yr!"[785] This indicates Google Ads' significant value to publishers as early as a decade ago, consistent with its substantial market power even at that time.

(539) Moreover, beginning in 2013, Google began dynamically varying Google Ads' margin by adjusting the two bids that Google Ads submitted into AdX through programs referred to as Google Ads Dynamic Revenue Share ("Google Ads DRS") and Project Bernanke.[786] Google Ads' ability to

[783] *See* GOOG-AT-MDL-006218271, at -284–286 (01/06/2023).

[784] GOOG-DOJ-10733927, at -933 (n.d.). Before 2019, AdX ran a second-price auction where the winning bidder pays the maximum of the second-highest bid or the reserve (or floor) price. By submitting a second bid from Google Ads, Google would increase the payment to the publisher in the event AdX served the ad, and both the highest and second-highest bids into AdX were from Google Ads. This would also tend to increase the auction price paid by the winning Google Ads advertiser.

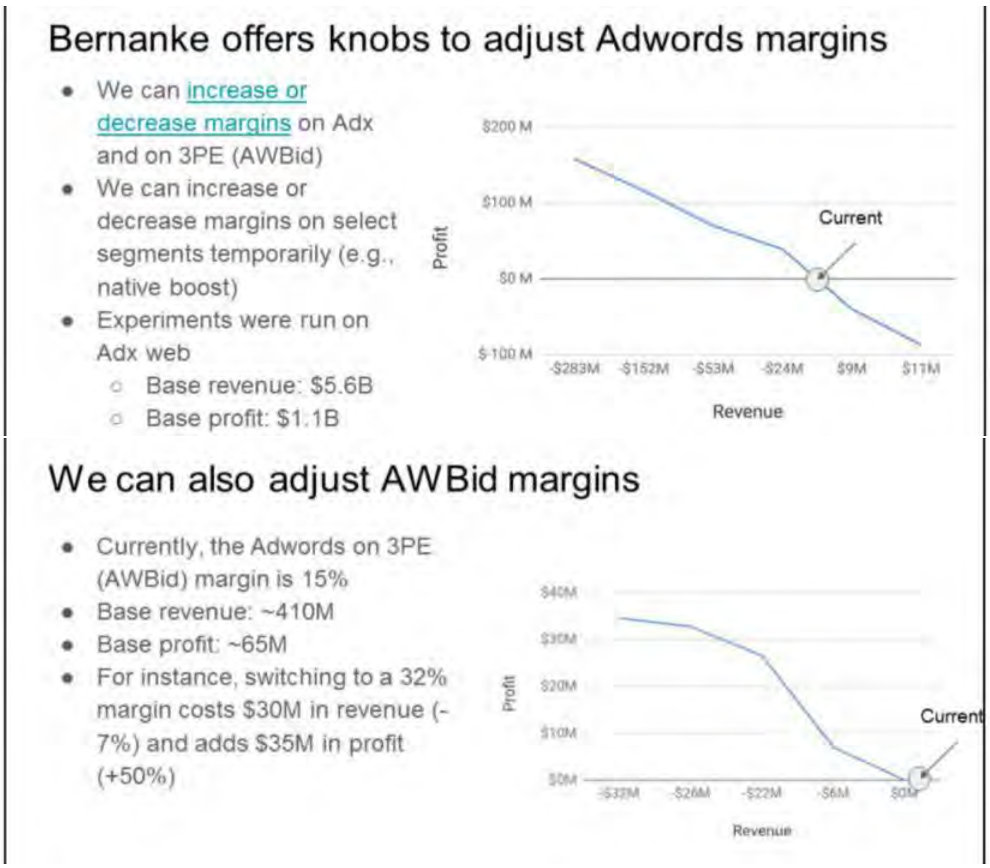
[785] GOOG-DOJ-28386151, at -154 (12/10/2013).

[786] Project Bernanke allowed Google Ads to bid such that it earned a a lower margin in certain auctions and a higher margin

control prices is evident in documents describing Project Bernanke. For example, Figure 59 from a 2018 presentation shows that Google characterized Bernanke as "offer[ing] knobs to adjust Adwords margins"—i.e., control price for Ads—to increase profits.

(540) In another slide from the same presentation, also shown in Figure 59, Google noted that it could adjust margins for its AWBid product which allowed Ads to bid on third-party exchanges for a limited set of impressions (see Section VII.B): the figure shows that increasing Ads' margin from 15% to 32% on AWBid transactions would significantly increase its profits (see last bullet point in Figure 59).

Figure 59. Google Ads' ability to control margins and increase profits



Source: GOOG-DOJ-10733927, at –942, –943

(541) Additionally, Google introduced an update to Project Bernanke in 2016 that altered Google Ads' bids for certain publishers that Google detected as engaging in "calling" AdX multiple times for the same

in others. In the majority of wins (85% of the time according to a 2013 document) Google Ads second priced itself, and thus it could lower the second bid that it submitted and increase its take rate on what it deemed to be less competitive auctions. *See* GOOG-DOJ-06842351, at -356 (10/2013), Google continues to engage in variable pricing with Ads via Project Alchemist. *See* Appendix L.4 for further discussion on Google Ads' dynamic revenue sharing programs.

bidding opportunity.[787] A Senior Director of Engineering at Google noted that "Google communicated with multi-call publishers that Google Ads would be making some changes to how it submitted bids in response to multi-calling" in order "to encourage them to reduce usage of multi-calls."[788] Google's acknowledged use of Google Ads' bidding behavior to affect how publishers engaged in yield management is a recognition of Google Ads' substantial market power—in a competitive market, Google Ads' ability to reduce publisher payouts below competitive levels would be constrained by other demand sources that publishers could substitute to (as those demand sources would then win the auction instead of Google Ads). I discuss this program further in Appendix L.4.

(542) The ability of Google Ads to engage in significant price discrimination across publishers and charge widely varying margins is also indicated by analysis of the data produced in this matter. In Appendix E.4, Figure 114 and Figure, I show that there exists significant dispersion in Google Ads' margin among large publishers. For example, in 2022, weighting by impressions: 42% of the top 100 publishers were charged an average margin of less than 10%, 29% were charged an average margin between 10% and 12.5%, and 29% were charged an average margin greater than 12.5%.[789]

(543) These are clear indicators that Google Ads possesses substantial market power, as that it has the ability to profitably charge fees (i.e., target margins) above competitive levels.

V.D.3.b. Google Ads is able to significantly deviate from competitive behavior in the advertiser ad network market and meaningfully impact publisher payouts

(544) Google's substantial market power in the advertiser ad network market is also strongly evident in its restriction on Google Ads' ability to bid into rival exchanges without losing significant transaction volume.[790] One Google document noted that this "exclusivity" between Google Ads and AdX "makes AdX more attractive to sellers."[791] However, Google also acknowledged that restricting Google Ads from purchasing inventory on third party exchanges strongly disadvantages Google Ads relative to other ad networks.[792]

[787] GOOG-AT-MDL-008842383, at -386 (08/05/2023) (Declaration of Nirmal Jayaram, "Global Bernanke was subsequently updated in October 2016. This update, relating to the detection and management of multiple calls, was sometimes referred to internally as 'Bell v.2.' Under Bell v.2, Google Ads would modify its bidding behavior (to decrease bid variance) when receiving multiple calls for the same ad request to protect advertisers from the risk of price inflation. A 'call' refers to a publisher's request that an ad exchange supply an ad to show in response to a specific ad opportunity when a user has navigated to the publisher's property. Some publishers would call an ad exchange, such as AdX, multiple times for the same potential ad opportunity.").

[788] GOOG-AT-MDL-008842383, at -386 (08/05/2023) (Declaration of Nirmal Jayaram).

[789] DRX Internal Stats data (DOJ RFP 57).

[790] *See* Section VII.C.1. for more details on Google Ads' bidding relationship with AdX.

[791] GOOG-DOJ-05247075, at -083 (09/14/2012).

[792] GOOG-DOJ-05247075, at -083 (09/14/2012) ("GDN is competitively disadvantaged against buy-side competition … In the auction ecosystem, we appear to be running a buyside-subsidizes-sellside model; we are artificially handicapping our buyside (GDN) to boost the attractiveness of our sellside (AdX)."). *See* Section VII.C.1 for further discussion.

(545) Despite restricting Google Ads' ability to bid through rival ad exchanges, Google Ads has maintained a dominant market share in the advertiser ad network market across a variety of measures. The dominance of Google Ads despite being disadvantaged to strengthen AdX is consistent with Google Ads' possession of substantial market power. This is because, again, in a competitive market, an ad tech product (all else equal) would not likely be able to profitably restrict access to inventory available to its advertiser customers, as doing so would risk losing a large amount of its transaction volume to rivals that did not impose such restrictions.

(546) Next, I present an analysis of the data produced in this matter that demonstrates the importance of Google Ads for monetizing publishers' display ad inventory. This represents evidence of Google Ads' substantial market power and ability to profitably charge supracompetitive fees. (In Section VII.B and VII.F.1, I provide additional evidence that access to Google Ads' demand contributed meaningfully to AdX's market power and attractiveness to customers.[793])

(547) I performed a simulation exercise in which I removed all Google Ads' bids from a random sample of GAM auctions run in June 2023,[794] and for impressions within GAM that Google Ads had previously won (comprising 27.8% of transactions in the sample), assigned the publisher payout for the impression to the value of the next-highest bid. I found that the impact of removing Google Ads demand from GAM auctions would have substantial effects on publisher monetization. First, of the auctions Google Ads won, 51.7% had no competing[795] non-zero bidder, meaning that without demand from Google Ads, publishers would likely not have monetized this inventory at all. Second, for the remaining transactions previously won by Google Ads that are assigned to the next-highest non-zero bid, I found that the payout would fall by 38.5%. The simulation also indicates that the number of transactions won by AdX in GAM would fall by 40.2%.

(548) Across all GAM auctions in the sample, total publisher payout would decrease by 14.4% if Google Ads were removed and its impressions were reassigned in this manner. I repeated this exercise by removing instead different demand sources identified in the data. No other single demand source identified in the data had a larger impact on publisher payouts than Google Ads. The demand sources identified in the data with the next largest reductions in publisher payouts were DV360 (6.2%),

[793] For example, GOOG-DOJ-04004392, at -397 (2018) (An internal Google memo which states, "Recent market dynamics (header bidding, Amazon TAM offering, free mediation in apps) are putting pressure on the 20% [AdX] fee and it is becoming more clear that the market bears the fee primarily because of exclusive access to our AdWords demand.").

[794] This exercise was performed using the GAM log-level data, which contains impressions sold during the 35th-through 39th seconds of every minute of June 2023, excluding June 28, which is captured in full. The analysis sample for this chart is a 1-in-60 sub-sample (minute 9 of each hour) of the June 1st GAM sample. Out of the 31,865,691 auctions thus drawn, I exclude approximately 4.1% due to errors in the data production. *See* 2023.11.20 Letter from D. Pearl to M. Freeman, November 20, 2023. Additionally, I exclude 0.8% with winning bid CPMs of $100 or greater, and 0.8% because the auction included Programmatic Guaranteed, Private Auction, or Preferred Deal bids.

[795] I consider only non-winning bids for which the variable "win_loss" is equal to "Lost," meaning that the bid competed directly against the winning bid, was above the price floor, and was not blocked by the publisher due to attributes of the ad or the advertiser.

"Header Bidding Yield Group" (2%), Index Exchange (0.5%), and Rubicon (0.5%); all other ad exchanges and DSPs had an impact below 0.5%.[796]

(549) Note that this analysis likely understates the impact that the removal of Google Ads' bids would have had on publisher payouts, as it does not account for the change in the bids of other auction participants. As I discussed in Section III.E, additional competition tends to generate *higher* bids into a first-price auction (which is the auction format used by AdX and GAM during this time period). By introducing additional competition, Google Ads' participation in AdX auctions likely led to higher bids and higher publisher payouts *even for transactions that Google Ads did not win.*[797]

(550) The results of my analysis indicating the importance of Google Ads' participation on publisher payouts are also consistent with a 2014 Google auction simulation studying the "Impact of GDN not participating in AdX auctions":[798] among a sample of 7.5B daily queries on AdX (of which 5.3 billion or over 70% were won by Google Ads), the simulation found that without Google Ads demand, the number of queries won by AdX would fall by 51%, Google revenue would fall by 70%, and publisher payout would fall by 65%.[799] The simulation found that much of the reduction in publisher payout was from those queries where Ads had previous won, both because "a large number (70%) go unmatched" and "the RPM on queries won now by AdX buyers is only a third of the RPM on queries

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[796] Third-party ad exchanges are identified in the data only when participating through Exchange Bidding. Some exchanges may also participate in the auction through remnant line items captured by the "Reservation" category. The "targeted_custom_criteria" field from the GAM log-level data contains publisher-entered tags which include, among other information, the names of exchanges that the publisher wishes to solicit bids from. These fields often contain multiple exchanges. I understand that Google uses this information in identifying both the presence of header bidding within DFP as well as the underlying exchanges. *See* GOOG-AT-MDL-008928566, at -575, -579, and -586 (08/23/2017. To obtain a more conservative estimate of the impact of removing each exchange, I performed the following exercise, in turn, for each of the top 5 Open Bidders on GAM (Rubicon, Index Exchange, PubMatic, OpenX, and MediaNet): I assigned to it all instances of "Reservation" bids for which the exchange's name or header bidding code (e.g., "ix" or "indexexchange" for Index Exchange) appear in the "targeted_custom_criteria" field (ignoring other exchanges or "!" signs), then simulated removing those bids as well at that exchange's bids from the dataset. I find that the respective impact, in terms of foregone publisher revenue, is: 2.1% for Rubicon, 2.2% for IndexExchange, 1.5% for PubMatic, 0.8% for OpenX, and 0.4% for MediaNet.

Header Bidding in Yield Groups ("HBYG") are defined by Google to be header bidders "with whom Google has a contractual relationship" and are provided minimum-bid-to-win information; these were launched in 2022 in response to commitments with the French Competition Authority. *See* GOOG-AT-MDL-006217592, at -603 (12/12/2022).

[797] To see this another way, consider the same exercise of removing Google Ads' bids from a set of *second-price* auctions. Again, for those transactions that Google Ads would have won, if Google Ads' bids were removed then those transactions would go to a different winner at a lower transaction price (or be unmatched), thereby reducing publisher payouts. However, there is an additional effect for transactions that Google Ads did not win. For these transactions, if Google Ads' bids were removed, publisher payouts would also fall whenever Google Ads had placed second, since those transactions would now clear at lower auction prices (recall that under a second-price auction, the winner pays the second-highest bid). This additional effect—i.e., of Google Ads "second pricing" other bidders—is an example of how Google Ads' participation in an auction can affect payouts even for transactions that it does not win, and is recognized in the Google simulation described next. *See generally* GOOG-DOJ-15140608 (01/2014) (A Google analysis by Nirmal Jayaram titled "Impact of GDN not participating in AdX auctions").

[798] Google Senior Director of Engineering Nirmal Jayaram testified that, "Auction simulation is the process of trying to do an offline analysis, so not in real auctions, but in a simulated setting, trying to understand the outcome of certain scenarios." Deposition of Nirmal Jayaram (Google) September 17, 2021, 135:24-136:4. Mr. Jayaram described the simulation as "referring to AdWords not participating on AdX auctions." 138:23-25.

[799] GOOG-DOJ-15140608, at -608–609 (01/2014).

won by [Google Ads] earlier."[800] In addition, the simulation found that some reduction in publisher payout would result from "GDN no longer second pric[ing]" queries on which an AdX buyer had previously won.

(551) Combined, these simulation results indicate that Google Ads was and continues to be a uniquely large and important buyer of publisher inventory, meaningfully impacting publisher payouts through its bidding behavior, and supports the conclusion that Google Ads' possesses substantial and sustained market power.

[800] GOOG-DOJ-15140608, at -608–609 (01/2014). ("Q. Can you help me understand what this is saying? A. I think what it is saying is if GDN did not participate on those queries that were being won by GDN, 70 percent of them go unmatched in the AdX auction. Q. So does that mean that there's no winner for those auctions? A. There is no winner in the AdX auction.") Deposition of Nirmal Jayaram (Google) September 17, 2021, 142:15–142:24.

(627) Google documents also describe expectations that competitive pressure would arise from third-party access to Google Ads demand. A 2015 document stated that "[r]egardless of the financial reality the value proposition of our sell-side products will be greatly impacted by the news of GDN buying cross-exchange," and that "during the life of AWBid our exchange partners have been contractually obligated to keep this fact secret."[880] The document further states that "[w]hen our competition is able to say they have access to GDN, whether it is equal or not, our sales and marketing teams will have to be prepared for significant competitive pressure."[881]

(628) Since its launch, AWBid has not gained a large fraction of Google Ads' spending. A 2015 document indicates that "[a]s of November 2015, GDN is spending ~$230K per day (1.2% of total GDN spend) via AWBid"[882] and that guidance for 2016 "currently reflects daily AWBid spending increasing to ~$900K per day (2.3% of total GDN spend, 7.6% of GDN remarketing spend)."[883] A July 2018 document noted that AWBid represented "3.5% of GDN gross revenue".[884]

(629) I have examined Google Ads' purchasing behavior using data that have been produced in this matter. Since 2014, Google Ads impressions won through non-Google products (i.e., not AdX or AdSense) have not represented a meaningful proportion of Google Ads demand. As shown in Figure 66., almost all of Google Ads demand was sourced through AdX or AdSense. During the period January 2014–March 2023, "non-Google inventory" (i.e., impressions not served through AdX, AdSense, or Demand Product) accounted for approximately 3% of Google Ads' open-web display impressions, with AdX and AdSense accounting for over 97%.[885] In 2022, "non-Google inventory" accounted for less than 6% of Google Ads' impressions.[886] These percentages are similar to those based on revenues from a 2020 Google document that reported 2019 Ads' revenues as 3.6B through AdX, 2.9B through AdSense, and 0.4B through non-Google sources.[887]

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initiative has some risk in that it is offering additional revenue to AdX's competitors, and is weakening one of AdX's unique selling points (access to Google AdWords demand)."); GOOG-DOJ-14826585, at -586 (n.d.) ("The enablement of AdWords on 3rd party inventory sources will incentivize clients to move from AdX and AdSense to Rubicon, PubMatic, and AdMeld.").

880 GOOG-DOJ-11765613, at -614 (12/12/2015).

881 GOOG-DOJ-11765613, at -614 (12/12/2015).

882 GOOG-DOJ-11765613, at -613 (12/12/2015).

883 GOOG-DOJ-11765613, at -614 (12/12/2015).

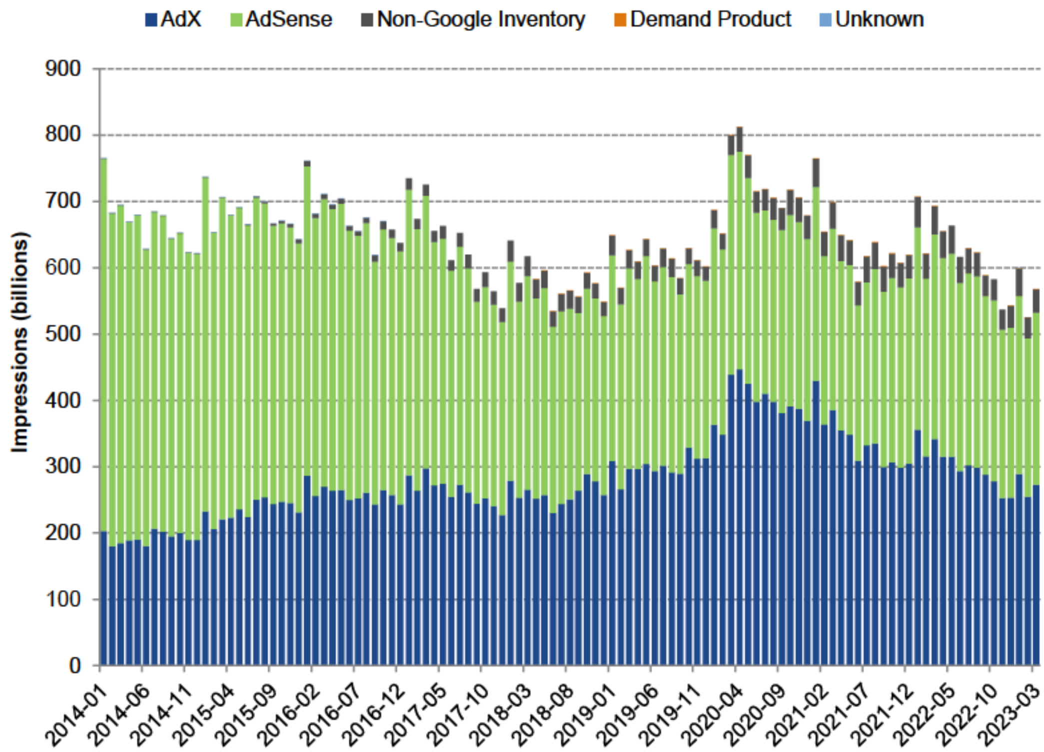
884 GOOG-DOJ-AT-02118579, at -580 (07/11/2018).

885 Subject to the data limitations applied to Figure 66. and excluding Google O&O properties. These figures are for worldwide impressions; statistics based on impressions from US advertisers are similar, with 4% of Ads' open-web impressions in 2022 being sourced from non-Google inventory.

886 I conservatively excluded Google owned-and-operated (O&O) properties from these calculations. Including Google O&O properties would increase the denominator and therefore decrease the "non-Google inventory" percentage of Google Ads open-web display impressions. Advertisements placed through Google Ads can appear on Google Finance, Gmail, Blogger and YouTube. *See* Google, "Where your ads can appear", accessed December 17, 2023, https://support.google.com/google-ads/answer/1704373?hl=en.

887 GOOG-DOJ-09559968, at -972 (01/30/2020).

Figure 66. Google Ads purchases primarily through AdX and AdSense (worldwide impressions)



Source: Google Ads data (DOJ RFP 54).
Notes: Limited to worldwide indirect open-web display impressions. Excludes impressions on Google properties. Google Ads accesses non-Google inventory through AWBid *see* GOOG-DOJ-05244847, at -849, (02/23/2011). Google employees have used the term "Non-Google inventory" in the context of AWBid, *see* GOOG-DOJ-03234677, at -677 (05/11/2016).

(630) Using Google's log-level data from June 2023, I calculate that AdX's share of Google Ads worldwide indirect open-web display impressions on ad exchanges is 91% and third-party exchanges' share is 9%.[888] These data also allow me to examine how competitive Google Ads is when bidding across different exchanges. For this set of impressions, when Google Ads bid into an AdX auction, Google Ads (and AdX) won the impression 26% of the time; however, when Google Ads bid into a rival exchange, it won the impression through that rival exchange 1% of the time.[889] This wide difference in "win rates" when Google Ads bids into AdX versus when it bids into a rival ad exchange is consistent with Google Ads' bids into rival exchanges being less competitive than those it submits

[888] Google Ads-AdX log-level data; Google Ads-Third Party Exchange log-level data (see Appendix H.1). I exclude AdSense from the calculation to highlight the share of Google Ads demand that goes to AdX versus non-Google rival ad exchanges; including AdSense would increase the share of Google Ads demand that goes to Google products (AdX or AdSense).

[889] This low win rate on rival ad exchanges is comparable to, but lower than, a 2019 Google presentation that reported a 3% "win rate" for AWBid (GOOG-DOJ-14298902, at -911 (10/04/2019). Note that Google Ads' win rate when bidding into AdX compares impressions that Google Ads bids on and wins against impressions that Google Ads bids on but does not win, regardless of whether AdX ends up serving the impression. Hence, Google Ads' win rate when bidding on AdX is not the same as Google Ads' share of transactions that AdX wins.

Direct represented $93 million in revenue, compared to $1.05 billion of "DFP Backfill to AdX," or 8.2% of combined AdX display revenue.[933]

(652) This presentation also indicates that the share of AdX Direct spending on third-party ad-servers is a smaller share of total AdX Direct revenues. In particular, in Q4 2017, the presentation states that a significant proportion of total AdX Direct revenue are from proprietary (not third-party) ad servers or from publishers already on a Google Platform.[934] The presentation also indicates that at most 35.7% of AdX Direct revenues come from categories that include third-party ad servers.[935]

(653) If the share of usage on third-party ad servers for AdX Direct overall is the same as for display alone then combining the previous two figures—8.2% and 35.7%—suggests that third-party ad servers received less than 3% of AdX's total display revenues via AdX Direct in Q4 2017.

(654) My analysis of the data produced in this case indicates that AdX Direct's significance is also small in more recent years. In 2022, AdX Direct generated $3.5 million in revenue from US publishers and $47 million in worldwide revenue for indirect open-web display.[936] This corresponds to less than 1% of total AdX revenue, both in the US and globally.[937] However, as the previous discussion has shown, third-party ad servers likely make up only a small portion of AdX Direct's overall usage. Hence, these calculations also likely overstate the extent to which AdX Direct provides access to DFP's rivals in the publisher ad server market in 2022.

(655) In Figure 67, I plot the overall share of worldwide AdX open-web display revenue originating from AdX Direct over time. It has been declining, falling from approximately 15% at the start of 2017 to less than 1% in 2023. As discussed above, however, AdX Direct revenue does not represent only revenue transacted to third-party publisher ad servers, and instead may be provided to: (i) publishers already using DFP and not another third-party publisher ad server[938] (in Figure 67 I show the difference between "Non-DFP users" and "DFP users," where "DFP users" are those publishers that received revenue from DFP in a given month); (ii) publisher using proprietary publisher ad servers that are not available to other open-web publishers; and (iii) publishers that do not use a publisher ad

[933] GOOG-DOJ-03634896, at -898 (2018). The 8.2% figure is obtained by dividing $93 million by ($1,045 million + $93 million).

[934] GOOG-DOJ-03634896, at -902 (2018) ("Proprietary AdServer make up 32% of AdX Direct revenue, with large App component"); GOOG-DOJ-03634896, at -905 (2018) (reporting 16.3% of publishers "On Platform (DRX / AdMob)[:] Publishers with majority of inventory already flowing into our platforms").

[935] GOOG-DOJ-03634896, at -904 and -908 (2018) (Indicating in Q4 2017, 11.7%-15.4% of AdX Direct revenue is from third-party ad servers, and 20.3% from "NPM (not already on Platform)", which "[m]ight use proprietary or 3P ad-server").

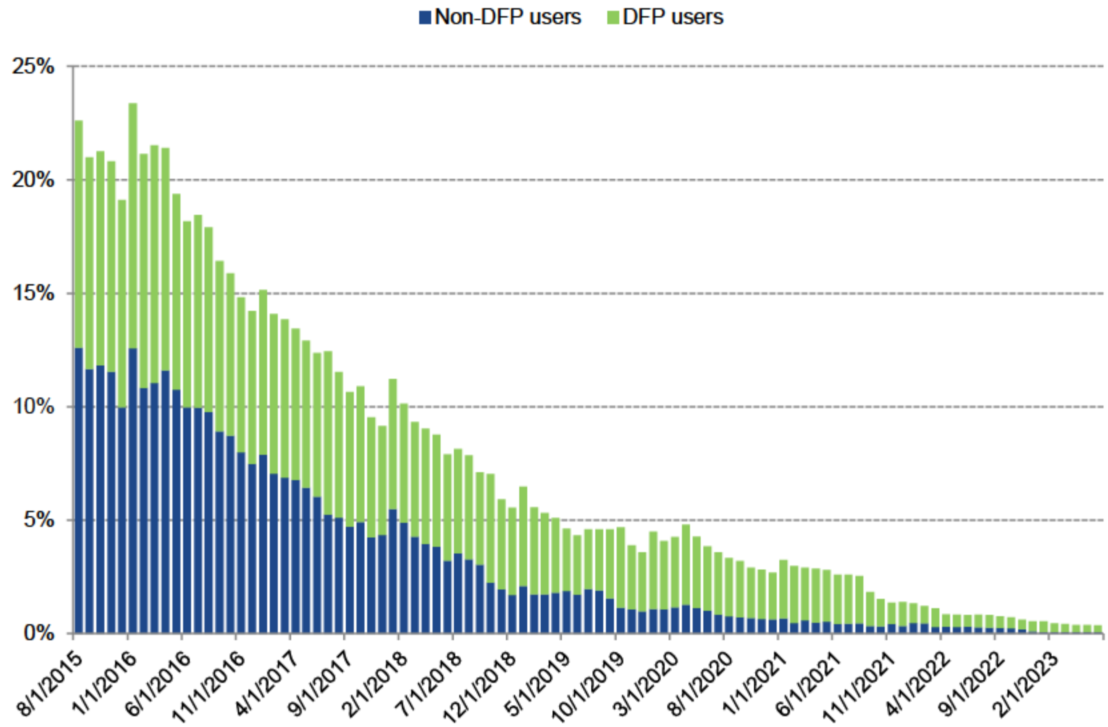
[936] Google DRX Internal Stats data (DOJ RFP 57). AdX Direct generated roughly $39 million in revenue from publishers with unknown geographies. Even if all publishers with unknown geographies are categorized as located in the US, AdX Direct revenues for US publishers would be less than 2% of total US AdX revenue.

[937] Google DRX Internal Stats data (DOJ RFP 57).

[938] As described in the 2018 "AdX Direct Overview" presentation, a significant percentage of AdX Direct revenue was attributable to publishers "on platform", using either DRX or AdMob.GOOG-DOJ-03634896, at -905 (2018).

server.[939] Hence, even in earlier years, AdX Direct likely did not provide a meaningful share of AdX demand to third-party ad servers.

Figure 67. AdX Direct's share of AdX worldwide indirect open-web display advertising revenue



Source: DRX Internal Stats data (DOJ RFP 57).
Notes: Limited to indirect open-web display revenue. A publisher is defined at the web property code level due to limited publisher information at the GFP network level in the DRX data. A publisher is considered a DFP user in each month where that publisher collected revenue through DFP. This figure excludes impressions won by exchange bidders.

VII.C.3.b. Hybrid setups still require the use of DFP

(656) Google documents also refer to "hybrid" setups that "very few partners" using third-party ad servers have used to obtain a form of real-time competition between AdX and rival ad exchanges.[940] Under this setup—*which still requires the use of DFP as a secondary ad server*—a third-party publisher ad server first determines the best bid from all other demand sources and then passes that bid as a floor to DFP, which sets the floor for AdX.[941] One of those documents explains that publishers might prefer a hybrid setup because they get access to "the benefits negotiated with the 3rd party ad stack provider (partners often refer to 3rd-party providers aggressively waiving their fees)".[942] However, the

939 GOOG-DOJ-09167513, at -517 (2019).

940 GOOG-DOJ-32280764, at -765, -769 (07/2019); GOOG-DOJ-04720129, at -129, (05/2018).

941 *See* EQUATIV-000000001, at -022 (06/02/2023); DM_GOOG_0000008, at -008 (n.d.).

942 GOOG-DOJ-32280764, at -765 (07/2019).

bidding tools. As an internal Google document acknowledged, "remember our margin is essentially a tax, it's reducing efficiency at any value above 0."[1205]

(806) As discussed in Section III, transaction fees in the ad tech stack can be analyzed in a manner similar to a value-added tax. The economic literature on tax incidence notes that the burden of a tax will fall on both buyers and sellers as long as neither side of the market perfectly substitutes away in response to a change in price.[1206] Thus, as long as advertisers would not completely substitute away from transacting through ad tech products for a small price increase, and publishers would not completely substitute away for a small payout reduction, the burden of Google's ad tech tax is borne by both sets of customers. In Section IV, I explained why this is likely the case.

(807) Google's experiments and simulations have also indicated that higher margins and fees for Google Ads and AdX harm publishers.

(808) For example, in 2016 simulations (described earlier in Sections V.C.3.a and V.D.3.a), Google varied the take rates on AdX and Google Ads and reported changes in its gross and net revenues as well as publisher payout.[1207] Figure 75 reports the change in publisher payout on AdX publishers from these simulations: holding Google Ads' margin fixed at 20%, as AdX's take rate increases from 0% to 15%, publishers' payout strictly falls.[1208] The same set of simulations shows that publisher payout falls when Google Ads' margin increases, holding fixed AdX's take rate: for example, across the row with a fixed AdX take rate of 10%, increasing Google Ads' take rate leads to a reduction in publisher payout.[1209]

[1205] GOOG-DOJ-AT-02218556, at -561 (05/25/2019) (A Google document between the "gTrade team" and "GDN Auction team" discussing Project Bernanke and Ads' margins.).

[1206] *See* Appendix I.

[1207] GOOG-DOJ-04615040, at -043 (11/11/2016). This document provides a table of "Gross Revenue," "Net Revenue," and "Publisher Payout" based on varying margins for AdX and GDN (Google Ads). All of the reported percentage changes are expressed relative to then current AdX's take rate of 20% and Google Ads' margin of 15%.

[1208] For example, an increase in AdX's take rate from 10% to 15% results in a reduction in publisher payout of approximately 3.5% of what publishers receive under the baseline scenario (the 3.5% corresponds to the difference between 4.18% and 0.66%). The baseline scenario involves a 15% Google Ads' margin and 20% AdX's take rate.

[1209] By approximately 2.8% of what publishers receive under the baseline scenario (the 2.8% corresponds to the difference between 4.18% to 1.35%).

Figure 75. Results of Google's 2016 simulation varying Google Ads margin and AdX take rate on change in AdX publisher payout

AdX take rate	Google Ads margin				
	15%	20%	25%	28%	32%
0%		11.23%			2.96%
5%		7.71%		2.11%	
10%		4.18%	1.35%		
15%		0.66%			
20%	0.00%				

Source: GOOG-DOJ-04615040, at -043 (11/11/2016). The table represents the change in publisher payout to AdX publishers relative to the baseline scenario of 15% Google Ads margin and 20% AdX take rate.

(809) Two other Google experiments and simulations discussed in Section V.D examine the impact of Google Ads' margin on publisher payout. They also indicate that changes in fees in the advertiser ad network market (and not just the exchange market or publisher ad server market) can have a meaningful effect on publisher payout as well, and that an increase in Google Ads' margin harms both publishers and advertisers.

(810) A 2018 Google document summarizing the results of simulations in which Google varied Google Ads' margin from 10% to 25% in steps of 2.5 percentage points, relative to a baseline then-in-effect margin of 15%, shows that as Google Ads' margin increases, AdX web publishers' payout falls, both when considering their transactions with Google Ads' buyers and also when considering their transactions with all buyers.[1210] Figure 76 shows the summary tables from this document. For example, when Google Ads' margin was increased from 15% to 20% (fourth row in the table), AdX publishers' payout for transactions with Google Ads' buyers decreased by 9.1% and their payout for transactions with all buyers decreased by 2.9%.

[1210] GOOG-DOJ-04736246, at -247–48 (05/09/2018). *See also* GOOG-DOJ-05277697, at -698–699 (05/10/2018) ("At 20% buy side margin, revenue goes down -0.9% (-$53M) but the overall (buy+sell side) profit increases 6.5% ($70M). At 17.5%, revenue drops -0.4% (-$24M) and the profit increases 4% ($40M). At these margins, for every dollar in lost revenue we gain much more than a dollar in profit.").

Figure 76. Results of Google's 2018 simulations that varied Google Ads margin

AdX web publishers (Google Ads buyers)

Margin	Matched Queries	Revenue	Profit	Payout
10%	+3.6%	1.1% ($23M)	-13.3% (-$86M)	7.2% ($109M)
12.5%	+2.1%	0.9% ($19M)	-6.1% (-$39M)	4.1% ($62M)
17.5%	-2.4%	-1.5% (-$32M)	5.8% ($38M)	-4.6% (-$70M)
20%	-4.8%	-3.2% (-$70M)	10.5% ($68M)	-9.1% (-$139M)
22.5%	-7.2%	-4.9% (-108M)	15.0% ($97M)	-13.7% (-$207M)
25%	-9.9%	-7.3% (-$157M)	19.0% ($123M)	-18.7% (-$284M)

AdX web publishers (all buyers)

Margin	Matched Queries	Revenue	Profit	Payout
10%	+1.9%	+0.2% (+$11M)	-8.1% (-$87M)	+2.4% (+$101M)
12.5%	+1.1%	+0.2% (+$9M)	-3.7% (-$40M)	+1.4% (+$57M)
17.5%	-1.3%	-0.4% (-$24M)	+3.6% (+$39M)	-1.5% (-$63M)
20%	-2.5%	-0.9% (-$53M)	+6.4% (+$70M)	-2.9% (-$125M)
22.5%	-4.9%	-2.7% (-$152M)	10.8% (+$116M)	-7.8% (-$326M)
25%	-7.8%	-5.0% (-$283M)	14.6% (+$158M)	-13.2% (-$552M)

Source: GOOG-DOJ-04736246, at -247–48 (05/09/2018). Change in gross revenue and net revenue (representing DV360, Google Ads, and AdX fees) and publisher payout on AdX web publishers from change in Google Ads margin.

(811) A 2014 Google document describing the effects of an experiment increasing the Google Ads margin for transactions on AdX from 14% to 15% shows that both publisher payout and the number of impressions declined for both all AdX transactions and for those won by Google Ads.[1211] Figure 77 summarizes results from the experiment. Publisher payout on AdX transactions with Google Ads' buyers decreased by 0.8%. Because the transaction volume declined by 0.25%, the results imply that the average per-impression payout on Google Ads-AdX transactions decreased by approximately 0.55%.[1212] Since the increase in Google Ads' margin is 1 percentage point, it follows that the increase in margin was likely borne by Google Ads advertisers in the form of higher advertising prices.

Figure 77: Results of Google's 2014 experiment that increased Google Ads margin from 14% to 15% on AdX web publishers' payout

For **AdWords on AdX** slice

- GDN profit +5.3%
- Google profit +2.2%
- Publisher payout -0.8%
- Revenue neutral
- REMH CPD +0.64 (noisy/neutral)
- -0.25% impressions

Overall on AdX pubs

- GDN profit +5.3%
- Google profit +1.7%
- Publisher payout -0.5%
- Revenue neutral
- -0.15% impressions

Source: GOOG-DOJ-AT-02096186, at -186–87 (03/2014). Document indicates GDN profit represents "GDN's net revenues on AdX transactions", and "Google profit is the amount of money collected from advertisers minus the amount paid to the publisher."

[1211] GOOG-DOJ-AT-02096186, at -186–87 (05/09/2018) (indicating that increasing Google Ads' margin on AdX from 14% to 15% resulted in "Publisher payout -0.8%" for "AdWords on AdX slice" and "Publisher payout -0.5%" for "Overall on AdX pubs").

[1212] The increase in Google Ads' margin to 15% reduces publisher payout to 99.2% of the baseline payout (i.e., 100% less 0.8%) and transaction volume to 99.75% of the baseline transaction volume (i.e., 100% less 0.25%). The average per-transaction payout for the 15% Google Ads' margin then equals 99.45% (i.e., 99.2% ÷ 99.75%) of the baseline per-transaction payout, which corresponds to a 0.55% decrease.

C.2. Summary of differences between digital advertising types

Figure 79. Summary of key differences between digital advertising types for advertisers

Ad type		Ad format	Typical cost model	Targeting capabilities
Web	Display	Image or text-based advertisements shown on the open web	Ad networks: CPC; CPC-to-CPM DSPs: CPM	User: Interests, demographics (from browsing history) Content: Placement, topic of website
	Search	Shown alongside search results from a search engine, may appear as "sponsored" links	CPC	User: Search keywords
	Instream video	Appear within a video player before, during, or after the original site video content	CPM, CPV, CPC	User: Interests, demographics (from browsing history) Content: Topic of video
Native	Content recommendation	Collections of links that suggest additional external content for users	CPC, CPM	User: Interests, demographics (from browsing history) Content: Placement, topic of website
	Social	Appear in social media feeds and closely resemble organic posts on those sites	CPC, CPM	User: Interests, demographics
	Sponsored listing	Appear as "Sponsored" listing promoting specific products alongside organic product listings	CPC, CPM	User: Interests, demographics (from browsing history), search keywords
App	Display	Appear as display ad in-app	CPM, CPC	User: Interests, demographics (from device tracking; dependent on user opt-in) Content: Topic of app
	Instream video	Appear as instream video ad in-app	CPM, CPV, CPC	

Notes: "Typical cost model" reflects costs to both advertisers and publishers. For instance, "CPC-to-CPM" transactions represent transactions in which advertisers pay on a CPC basis and publishers are paid out on a CPM basis. I used data produced by Google to identify typical cost models for web display, web instream video, app display, and app instream video ads (Google XP data (DOJ RFP 7), Google DV360 data (DOJ RFP 7)). See my backup materials. See also Figure 34 in Section IV.E.1.

Sources: 1. Display: IAB Internet Advertising Revenue Report for 2022, available at https://www.iab.com/wp-content/uploads/2023/04/IAB_PwC_Internet_Advertising_Revenue_Report_2022.pdf; Google, "Reach a larger or new audience with Google Display Network Targeting," Google Ads, March 20, 2023, https://ads.google.com/intl/en_us/home/resources/articles/reach-larger-new-audiences/ ("Google Display Network (GDN) targeting allows you to set where or when your ad is shown based on features of your ideal audience, such as their personal interests, age, or gender."); 2. Search: IAB, "Internal Advertising Revenue Report: Full-year 2022 Results", Apr. 2023, https://www.iab.com/wp-content/uploads/2023/04/IAB_PwC_Internet_Advertising_Revenue_Report_2022.pdf; Google, "What's online marketing?" Google Ads Help, https://support.google.com/google-ads/answer/6227161?sjid=7802735466321330464-NA ("When you advertise alongside search results on the Google Search Network, you select keywords to help target your ads to people searching for related terms. … When you advertise on websites that show Google ads (called the Google Display Network), you can get even more specific by choosing the age of the people you want to reach, the types of sites they visit, and their areas of interest."); Google, "Apply and report on Google Ads bid strategies," Search Ads 360 Help, https://support.google.com/searchads/answer/6155651?hl=en; 3. Instream video: https://www.iabuk.com/ctv/glossary; Google, "About targeting for Video campaigns," Google Ads Help, https://support.google.com/google-ads/answer/2454017?hl=enhttps://support.google.com/google-ads/answer/2454017?hl=en ("With a wide variety of targeting methods available to you, such as demographic groups, interests, placements, and your data segments, you can reach specific or niche audiences based on who they are, what they're interested in, or what content they're viewing."), Google, "About video ad formats," Google Ads Help, accessed December 19, 2023, https://support.google.com/google-ads/answer/2375464?hl=en.;

Figure 83. Regression of CPM on indicator variables for transaction type (2022)

Variable	Worldwide ln(Pub payout)	Worldwide Pub payout	US ln(Pub payout)	US Pub payout
Direct (Non-AdX)	1.1117***	4.9262***	1.1062***	7.0635***
	(0.0068)	(0.0447)	(0.0127)	(0.1130)
Direct (via AdX)	0.8512***	2.3383***	0.8281***	4.0857***
	(0.0073)	(0.0482)	(0.0154)	(0.1549)
Constant	-0.3511***	2.3826***	0.4171***	3.6228***
	(0.0018)	(0.0097)	(0.0041)	(0.0289)
Observations	408,690	408,690	67,074	67,074
Adjusted R-squared	0.6849	0.5892	0.6177	0.4874
Average dep. var. value	-0.1567	3.1886	0.6256	4.9003
Average dep. var. value (excl. cat.)	-0.4396	2.0249	0.3360	3.2618
Publisher fixed effects	YES	YES	YES	YES

Source: Google DRX Internal Stats data (DOJ RFP 57);
Notes: Data are collapsed to the month-publisher-transaction type, geography level. Dependent variable is CPM measured as gross revenue divided by impressions. Table displays results from a regression of CPM on publisher fixed effects, indicators for Direct (NonAdX) and Direct (via AdX) Excluded category is indirect. "Direct (Non-AdX)" indicates direct impressions not sold on AdX. "Direct (via AdX)" indicates direct transactions sold through AdX. Standard errors in parentheses. Dataset contains 2022 observations paid out in CPM. Restricted to open-web display. In the US specifications, publishers with unknown geography are excluded. ***Indicates statistical significance at the 0.1% level.

C.4. Summary of the presence of ad tech products outside the United States

Figure 84. Exchange impressions and spend by user and publisher location (2022)

Exchange	Geography	Share of impressions by user geography	Share of spend by user geography	Share of impressions by publisher geography	Share of spend by publisher geography
AdX	Rest of world	75%	52%	67%	54%
	US	25%	48%	33%	46%
[redacted]	Rest of world	84%	69%	85%	74%
	US	16%	31%	15%	26%
[redacted]	Rest of world	61%	34%	50%	39%
	US	39%	66%	50%	61%
[redacted]	Rest of world	64%	32%	59%	34%
	US	36%	68%	41%	66%
[redacted]	Rest of world	57%	27%	46%	28%
	US	43%	73%	54%	72%

Source: Exchange panel (*See* Appendix H.1.c).
Notes: I include indirect open-web display impressions in 2022. I only include AdX and third-party exchanges that produced data sufficient to identify transactions by user and publisher location. I exclude exchanges that produced data that includes transactions with missing or unknown location.

Figure 85. Share of publisher ad server impressions by publisher location (2022)

Publisher ad server	ROW	US	Missing
Google	66%	31%	3%
[redacted]	78%	22%	0%
[redacted]	76%	24%	0%
[redacted]	2%	60%	38%

Source: Publisher ad server panel (*see* Appendix H).
Notes: I include all open-web display impressions in 2022. This chart excludes publisher ad servers that primarily serve non-display ads: [redacted] I describe these publisher ad servers in more detail in Section V.B.2. When the data do not allow me to identify the publisher's geography, I include the impressions from those publishers in the "Missing" column. See Figure 45 for information on additional limitations.

Figure 86. Relative shares of indirect open-web display impressions by user and publisher location

Exchange	2020			2021			2022		
	Worldwide	US users	US publishers	Worldwide	US users	US publishers	Worldwide	US users	US publishers
Google AdX	88.5%	81.0%	81.9%	83.7%	75.8%	76.9%	81.1%	74.5%	75.8%
[redacted]	3.4%	4.7%	5.0%	6.8%	9.7%	9.6%	8.3%	11.0%	10.1%
[redacted]	4.6%	8.9%	7.9%	5.1%	8.5%	7.8%	5.2%	7.6%	7.6%
[redacted]	2.8%	5.0%	5.0%	3.2%	5.3%	5.3%	3.7%	5.9%	5.8%
[redacted]	0.8%	0.4%	0.2%	1.2%	0.7%	0.4%	1.7%	1.0%	0.7%

Source: Exchange panel data (*See* Appendix H).
Notes: I include AdX and third-party exchanges that produced data sufficient to identify transactions served to US users and transactions involving US publishers.

Figure 87. Relative shares of indirect open-web display fees by user and publisher location

Exchange	2020			2021			2022		
	Worldwide	US users	US publishers	Worldwide	US users	US publishers	Worldwide	US users	US publishers
GOOGLE ADX	80.9%	74.4%	74.6%	77.1%	70.1%	69.5%	75.6%	67.8%	67.7%
[redacted]	5.2%	6.6%	7.1%	9.7%	12.9%	14.0%	12.0%	16.2%	16.8%
[redacted]	8.5%	11.8%	10.8%	8.3%	10.7%	10.0%	7.8%	9.8%	9.2%
[redacted]	5.5%	7.2%	7.5%	4.9%	6.4%	6.5%	4.7%	6.3%	6.3%

Source: Exchange panel data (*See* Appendix H).
Notes: I include AdX and third-party exchanges that produced data sufficient to identify transactions served to US users and transactions involving US publishers. Net revenue data was not provided for [redacted]

Appendix D. Additional market shares figures

D.1. Additional exchange shares figures

D.1.a. Summary of exchange shares specifications

Figure 88. Summary of AdX's worldwide indirect open-web display shares among ad exchanges

Metric	Specification	2018	2019	2020	2021	2022
Impressions	[1] AdX share (baseline)	54%	60%	65%	60%	56%
	[2] AdX share (including DSP-to-PAS transactions)	53%	58%	63%	58%	54%
	[3] AdX share (excluding Verizon)	55%	62%	66%	61%	58%
	[4] AdX share (relative to parties that produced data)	67%	65%	71%	67%	63%
Fees	[1] AdX share (baseline)	47%	52%	51%	47%	43%
	[2] AdX share (including DSP-to-PAS transactions)	47%	48%	47%	45%	42%
	[3] AdX share (excluding Verizon)	49%	53%	52%	49%	46%
	[4] AdX share (relative to parties that produced data)	66%	60%	61%	59%	56%

Source: Google AdX data (DOJ RFP 53); Exchange panel (*See* Appendix H.1.c).
Notes: Specifications 1–3 are AdX's annual weighted average share of impressions and fees among exchanges that produced data in this matter as well as impressions and fees I estimate coming from exchanges that did not produce data on this matter. Appendix H.3 contains a description of how I perform this estimation. Specification 4 is AdX's annual weighted average share of impressions and fees among only exchanges that produced data in this matter. See Appendix H.1.c, which lists the exchanges that produced data in this matter.

D.2. Additional advertiser ad network shares figures

D.2.a. Summary of advertiser ad network shares specifications

Figure 97. Summary of Google Ads' worldwide indirect open-web display shares among advertiser ad networks, and among bidding tools (advertiser ad networks and DSPs)

Metric	Specification	2018	2019	2020	2021	2022
Impressions	[1] Google Ads share (baseline)	86%	88%	90%	90%	87%
	[2] Google Ads share (excluding Google Ads-AdSense transactions)	76%	80%	85%	84%	78%
	[3] Google Ads share (including imputed other bidding tools, which contain DSPs)	57%	60%	69%	67%	65%
Fees	[1] Google Ads share (baseline)	66%	69%	73%	78%	81%
	[2] Google Ads share (excluding Google Ads-AdSense transactions)	37%	43%	52%	59%	58%
	[3] Google Ads share (including imputed other bidding tools, which contain DSPs)	33%	33%	35%	42%	48%

Source: Google Ads data (DOJ RFP 7, 54); Bidding tools panel (*See* Appendix H.1.b).
Notes: Specifications 1–2 are Google Ads' annual weighted average share of impressions and fees among advertiser ad networks that produced data in this matter. Specification 3 is Google Ads' annual weighted average share of impressions and fees among advertiser ad networks that produced data in this matter as well as impressions and fees I estimate coming from bidding tools that did not produce data on this matter, which include DSPs. Appendix H.3 contains a description of how I perform this estimation. See Appendix H.1.b, which lists the ad networks that produced data in this matter.

Figure 98. Summary of Google Ads' US indirect open-web display shares among advertiser ad networks, and among bidding tools (advertiser ad networks and DSPs)

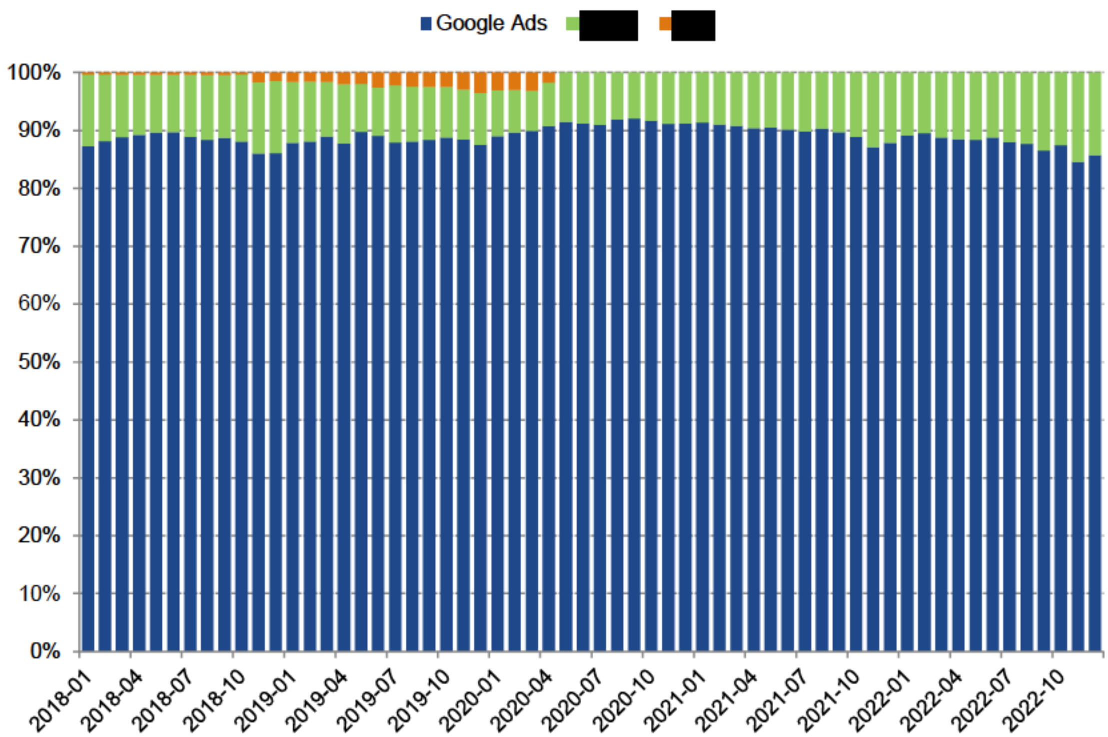
Metric	Specification	2018	2019	2020	2021	2022
Impressions	[1] Google Ads share (baseline)	88%	88%	91%	90%	88%
	[2] Google Ads share (excluding Google Ads-AdSense transactions)	81%	83%	87%	86%	82%
	[3] Google Ads share (including imputed other bidding tools, which contain DSPs)	48%	45%	58%	54%	55%
Fees	[1] Google Ads share (baseline)	72%	71%	75%	81%	83%
	[2] Google Ads share (excluding Google Ads-AdSense transactions)	43%	45%	55%	63%	61%
	[3] Google Ads share (including imputed other bidding tools, which contain DSPs)	33%	29%	31%	38%	44%

Source: Google Ads data (DOJ RFP 7, 54); Bidding tools panel (*See* Appendix H.1.b).
Notes: Specifications 1–2 are Google Ads' annual weighted average share of impressions and fees among advertiser ad networks that produced data in this matter. Specification 3 is Google Ads' annual weighted average share of impressions and fees among advertiser ad networks that produced data in this matter as well as impressions and fees I estimate coming from bidding tools that did not produce data on this matter, which includes DSPs. Appendix H.3 contains a description of how I perform this estimation. See Appendix H.1.b, which lists the ad networks that produced data in this matter.

D.2.b. US market shares in the advertiser ad network market (baseline)

(847) Below, I include versions of the market shares analyses I presented in my report, limited to impressions served to users in the United States.[1273]

Figure 99. Google Ads has maintained a substantial share of US indirect open-web display impressions in the ad network market

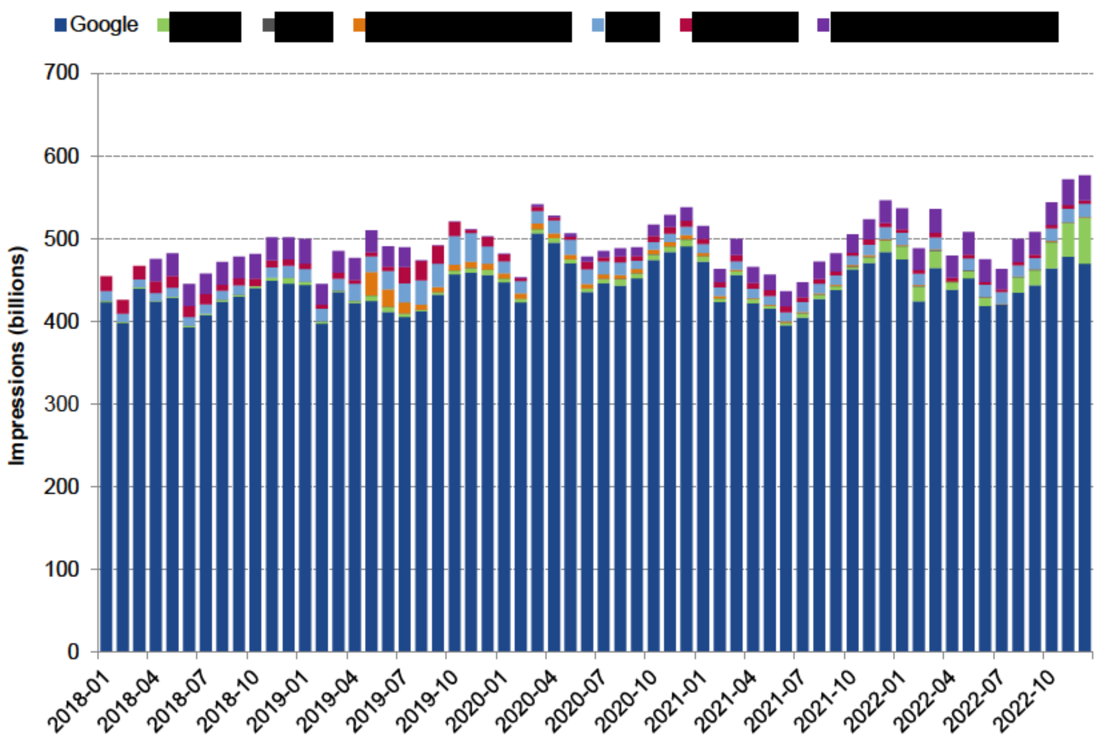


Source: Google Ads data (DOJ RFP 54); [redacted]
Notes: Denominator includes open-web display impressions from Google Ads, [redacted] Impressions include all indirect open-web display transactions from these parties. [redacted] exited the open-web display market in April 2020. Google Ads data only provides information for advertiser geography, while data for [redacted] provides only user geography information. This figure limits to US advertiser transactions for Google Ads and US user transactions for [redacted].

[1273] Due to data limitations, I cannot reliably identify user location in all datasets. See Appendix H.4.a.

D.4. Additional publisher ad-server shares

Figure 107. US open-web display impressions served by publisher ad servers (2018–2022)



Source: Publisher ad server panel (see Appendix H.)

Notes: 1. Limited to open-web display impressions on mobile and desktop devices through US publishers (includes house ads). 2. The [redacted] data do not contain information on device type, transaction type, ad type, instream/outstream or mobile channel. Since the data do not allow me to identify [redacted] open-web display impressions, I conservatively include all [redacted] impressions. 3. Similarly, the [redacted] data does not distinguish between ad types. Therefore, I conservatively include all [redacted] ad types. 4. [redacted] data and the [redacted] data do not distinguish between instream and outstream video ads, so I conservatively include all video impressions on in-market devices. 5. The [redacted] and [redacted] data do not distinguish between US and ROW publishers, so I conservatively include all [redacted] and [redacted] publishers. Geography information is unavailable for many of [redacted] impressions, so I conservatively include all of these impressions in the US share calculations The [redacted] data groups US and Canadian publishers, so both countries are included in this figure. Geography information is unavailable for some publishers in the Google data. To be conservative, I consider all of these publishers to be non-US publishers. 6. Due to reported data issues, [redacted] data is missing in July 2022. [redacted] data is missing in May, July, and November of 2018. [redacted] data is unavailable prior to May 2019; [redacted] data is unavailable prior to April 2018; [redacted] data is missing in October 2018 and April 2022.

Figure 108. Annual publisher ad-server impression shares with additional parties, global and US

Publisher geography	Publisher ad-server	2018	2019	2020	2021	2022
Worldwide	Google	91.7%	91.1%	93.5%	93.4%	91.0%
	[redacted]	4.6%	4.5%	4.3%	3.9%	5.8%
	[redacted]	0.0%	0.1%	0.1%	0.2%	0.3%
	[redacted]		0.9%	0.3%	0.1%	0.0%
	[redacted]	0.8%	1.6%	0.9%	0.7%	0.9%
	[redacted]	0.9%	0.7%	0.4%	0.4%	0.3%
	[redacted]	2.0%	1.1%	0.5%	1.3%	1.7%
US	Google	89.0%	86.7%	92.3%	90.7%	86.5%
	[redacted]	0.5%	0.8%	1.1%	1.1%	4.3%
	[redacted]	0.0%	0.0%	0.1%	0.1%	0.2%
	[redacted]		2.4%	1.1%	0.4%	0.1%
	[redacted]	2.4%	4.7%	2.8%	2.4%	2.8%
	[redacted]	2.5%	2.2%	1.2%	1.3%	0.8%
	[redacted]	5.7%	3.1%	1.5%	4.1%	5.3%

Source: Publisher ad server panel (see Appendix H).
Notes: 1. Limited to open-web display impressions on mobile and desktop devices (includes house ads). US geography is based on publisher location. 2. The [redacted] and [redacted] data do not contain information on device type, transaction type, ad type, instream/outstream or mobile channel. Since the data do not allow me to identify [redacted] and [redacted] open-web display impressions, I conservatively include all [redacted] and [redacted] impressions. 3. Similarly, the Xandr data does not distinguish between ad types. Therefore, I conservatively include all [redacted] ad types. 4. [redacted] data and the [redacted] data do not distinguish between instream and outstream video ads, so I conservatively include all video impressions on in-market devices. 5. The [redacted] [redacted] data do not distinguish between US and ROW publishers, so I conservatively include all [redacted] and [redacted] publishers. Geography information is unavailable for many of [redacted] impressions, so I conservatively include all of these impressions in the US share calculations. The [redacted] data groups US and Canadian publishers, so both countries are included in this figure. Geography information is unavailable for some publishers in the Google data. To be conservative, I consider all of these publishers to be non-US publishers. 6. Due to reported data issues, [redacted] data is missing in July 2022. [redacted] data is missing in May, July and November of 2018. [redacted] data is unavailable prior to May 2019. [redacted] data is unavailable prior to April 2018. [redacted] data is missing in October 2018 and April 2022. In these instances, I annualize the third party data to represent full years (except for [redacted] in 2018, where no months of the data are available).

Robin S. Lee, PhD

December 22, 2023
Date